

PRIZE DISSERTATIONS

By M. DAVID,

SURGEON AT ROUEN IN NORMANDY,

AS ADJUDGED BY THE ROYAL ACADEMY OF SURGERY IN PARIS.

F I R S T,

ON THE EFFECTS OF

M O T I O N A N D R E S T,

AND THEIR SEVERAL MODES OF APPLICATION IN SURGERY.

S E C O N D L Y,

ON THE VARIOUS EFFECTS OF

C O U N T E R - S T R O K E S

ON THE HUMAN BODY,

AND THE METHODS OF RELIEVING THEM.

TRANSLATED FROM THE ORIGINAL FRENCH, WITH COPIOUS ADDITIONAL
ANNOTATIONS,

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THE SUBJECT PROPOSED FOR THE PRIZE

BY THE

ROYAL ACADEMY OF SURGERY AT PARIS,

FOR THE YEAR 1778.

TO EXPLAIN THE EFFECTS OF MOTION AND REST, AND THE INDICATIONS ACCORDING TO WHICH THE USE OF EITHER SHOULD BE PRESCRIBED IN SURGICAL DISEASES⁽¹⁾.

MOTION and rest are certainly two methods of cure, the rational employment of which may contribute to enlarge the bounds of surgical knowledge, since the Academy, ever intent on the improvement of this salutary art, proposes for the subject of the prize they mean to distribute, to describe their effects, and to shew the indications which direct the use of them in surgical diseases. The discussion of a question of this nature, which is more interesting than it may appear at first sight, must necessarily suggest intentions of cure, which this celebrated body alone can perceive, and the exposition of which they may, perhaps, expect in vain

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from

from those who shall employ themselves on a subject so important. To treat it properly would require the united genius and knowledge of those learned men of which the society is composed; how is it possible then, that one man alone, left to his own powers, can flatter himself, that on so intricate a question, he shall be able to satisfy judges, before whom, moderate talents cannot appear without dread? This humiliating reflection would prevent me from entering the lists, were I not encouraged by the consideration of their indulgence, the inseparable attendants on learning. In granting the prize to the most skilful, they do not always despise the labours of those whom an honest confidence engages in the competition. Besides, if I have laboured unsuccessfully, my excuse will be in the greatness of the task, which, as it astonishes without discouraging me, I will proceed to exert my utmost efforts to fulfill.

The effects of motion in the animal œconomy are evident, but motion itself is an effect produced by its own causes. In order therefore to give as much clearness to the discussion of this question as it is capable of, it seems to me of some utility, to consider the source from whence motion is derived.—This may enable us to explain its effects with some precision, in consequence of which the application of them to surgical diseases, will become more methodical and certain. Such is the plan I propose to follow; the propriety of which will, I hope, appear in the unfolding of it.

It is to motion that the universe owes that life with which it is animated. Man, the epitome of the universe, discovers, in all the faculties which constitute and characterise him, the produce of an uniform and regular motion, subordinate to powers, the admirable mechanism of which will ever be unknown to us. But, without endeavouring to form conjectures concerning this mechanism, we may reasonably presume, that motion is the effect of a general active principle, dispersed throughout the universe, by that Being who created it. This principle is undoubtedly material, and among the several substances that constitute our globe, and the beings that adorn its surface, there seems to be but one that possesses

esses in itself this property of motion; that is FIRE; all the rest are in a state of inactivity.

This active principle, united to some of our fluids, conveys motion into the machine, and transmits it by means of organs appropriated to this effect⁽²⁾. These organs are the muscles, of which there are two kinds; some which are not subject to the controul of the will, and whose motion begun at the first moment of existence, is uninterruptedly continued to its end; such are the heart, the arteries, the stomach, the intestines, &c. There are others whose motion is subject to the will, and which cease to act whenever they are not determined by that principle, either for the wants or pleasures of the individual; such are the muscles destined for the motion of some of the parts of the human body, and employed in conveying us from one place to another.

This division determines two kinds of motion, which are distinguished from each other by very palpable lines of separation. — The one is employed in entertaining the vital principle, the other does no more than supply its exigencies and its pleasures; a difference so remarkable, that it necessarily implies one in the source from whence these motions are derived.

The nerves are the visible canals through which the active fluid we attribute these two kinds of motion to, is conveyed throughout the whole extent of the animal œconomy. Their origin is well known: they are all derived from the organs contained within the cavity of the skull; and amidst the numerous canals which take their rise from the medullary substance of the brain and cerebellum, we may distinguish those which are distributed to those important organs whose action, independent of the will, is absolutely essential to life; these are particularly the intercostal nerve and the eighth pair, which evidently arise from the processus annularis, or Pons Varolii⁽³⁾, formed, as it seems, by the union of the peduncles of the cerebellum, while no part of the medullary substance of the brain seems to enter into its composition. The nerves, on the contrary, which

which are distributed to organs destined to less important functions ; to such, for instance, whose province it is to direct our loco-motive powers, subject to the controul of the will ; these, I say, are all derived from the medullary substance of the brain, or from the spinal marrow which is the continuation of it.

From this observation we may be convinced that the fluid separated by the cerebellum is of a superior quality to that furnished by the brain, and that the functions of the first of these organs, are infinitely more important than those which are assigned to the latter. This superiority seems to be indicated by nature in the precautions she has taken to secure the cerebellum from external injuries. The brain, it is true, is likewise protected from them ; but the anxiety of nature in her precautions to prevent the injuries the brain might be exposed to, are infinitely less remarkable than those she has employed in sheltering the cerebellum from any hurt that might befall it from without. In fact, the situation of the cavities occupied by the cerebellum, the thickness of the occipital bone, in those parts where external shocks might take place, the quantity of muscles that surround that part of the basis of the skull where the bone is thinnest, the tentorium which covers the cerebellum, and prevents it from suffering compression from the posterior lobes of the brain ; the construction of this tentorium, made with a sagacity which cannot be sufficiently admired ; the speedy death which is the consequence of wounds inflicted on the cerebellum, while very material wounds of the brain are sometimes not mortal (^a) ; all these circumstances, I say, contribute to give the strongest degree of evidence to the superiority we have established.

But the brain and the cerebellum are not the only preparers of animal spirits ; we find other organs in the cavity of the skull, which leave us no room to doubt, that in her preparation of the nervous fluid, nature hath established a difference relative to the end she means to accomplish. The corpora striata, for instance, placed in the midst of the brain, are they not particular organs which display the whole apparatus for secretion ;

tion; to wit, a greyish substance, the secretory organ⁽⁴⁾, and a white or medullary substance, the union of which forms the origin of the first pair of nerves, destined to convey that particular fluid fitted to the purposes of smelling?

Do not the second pair of nerves, which become the immediate organ of vision, take their rise from a particular substance, distinguished by the name of *thalami nervorum opticorum*, and which seems to form a kind of smaller, in the midst of the larger brain? The medullary substance, which their external surface presents, is probably impregnated with a fluid already secreted in some other part, and which, in its passage through the greyish substance of these *thalami*, receives a higher degree of elaboration before it reaches the medullary substance, which is in their center, and which is the origin of the optic nerves, continually replete with a particular fluid, calculated solely to receive the impressions of light.

The pineal gland composed of a greyish substance, and which has two medullary threads produced from it, is it not also the strainer of a fluid destined to supply some important functions? The pituitary gland, the use of which we are as little acquainted with as with that of the former, may it not likewise be the elaboratory of some particular fluid absolutely necessary to life? This may, at least, be presumed, when we consider all the precautions nature has taken to secure it from outward injury, and from being compressed by the parts that surround it; for nature does nothing without necessity or without a motive, and wherever we can follow her steps, or discover them by conjecture, we find that her choice is always supported by reasons which compel us to admire and be silent^(b).

The third pair of nerves gives us another proof that nature does not make an indiscriminate use of the two sources we have indicated. It is from the medullary substance of the brain that this pair draws the fluid it supplies to the muscles that are governed by it, which are the movers of the eye, an organ endowed with automatic motions, produced by the

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fluid

fluid of the third pair, and with motions of expression which certainly require fluids derived from other sources. It is for this reason we see that the fourth pair, a small nervous filament, goes to receive the fluid it is to convey to the external oblique muscle of the eye, from the posterior and inferior part of the tuberculi quadrigemini^(s). The same thing may be observed of the branch of the sixth pair which goes to the *abductor*, and whose origin is at the Pons Varolii.

Had the globe of the eye wanted nothing more than a change of position, the third pair supplies it with filaments of a sufficient size to have produced this effect for as long a continuance, and as frequently as the functions of this organ might require, or otherwise this third pair would have been made more considerable at the expence of the large medullary mass of the brain; but the fluid supplied by this pair could not, probably, in many circumstances, have answered all the designs of nature for want of sufficient activity and energy. Love, anger, joy, sorrow, pride, and contempt, which are so strongly expressed by the eye, that it is with reason considered as the mirror of the soul, are undoubtedly affections which cannot be expressed by the powers of that grosser fluid which is secreted from the great reservoir.

It is true, that the two last branches of the fifth pair of nerves, as well as its ophthalmic branch which contributes to form the intercostal nerve, the remainder of the sixth pair which has not been employed in this foundation, and the seventh pair, derive the fluid they are destined to convey, from the medullary substance of the cerebellum, in common with the intercostal nerve and the eighth pair. But although the functions of the parts on which they are bestowed, do not immediately seem of so great importance as those of the parts to which the intercostal nerve and the eighth pair are distributed, yet it is no less certain that the cessation of their action would very soon be followed by death.

Were the secretion of the salivary fluid, were mastication, or deglutition, interrupted for a certain space of time, in vain would the heart, the
lungs,

lungs, the stomach, the intestines, &c., enjoy the power of fulfilling the offices assigned to them; the animal would soon cease to live. If the smell, the sight, and the hearing, be not absolutely essential to life, they are, at least, sensations which constitute the only pleasures of our existence, and the man, who should be deprived of them, would probably be ranked among the most stupid animals; it is even to be presumed that if the deficiency of the senses were not then filled up by some particular instinct, he would be unable to minister to his own wants, even in the midst of those productions which might be sufficient for the purpose.

From what has been said, we are obliged to allow, that the fluid which makes of man a living and thinking being^(c), which renders him capable of all those improvements that embellish his nature, is derived either from the medullary substance of the cerebellum, or from particular and very distinct organs of the brain itself; and that the loco-motive faculty which completes the animal machine, by adding greatly to the pleasures of its existence, is derived from the fluid furnished by the medullary substance of the brain. This presents to us two kinds of motion, as distinct from each other as the springs from whence they are derived. One kind, which essentially constitutes life, over which the will exerts no empire, and which is produced by the fluid separated from the cerebellum; another kind, not of such absolute necessity, subject to the controul of the will, and effected by the fluid separated from the brain.

These preliminary notions concerning the origin and the distinctions of motion being acquired, its effects on the animal œconomy will more easily be perceived, and the indications which direct the use of it, will be more readily suggested. These two points of discussion form a natural division of this essay into two parts. The object of the first will be to demonstrate the effects of motion and rest, and the second will discover the indications which prescribe the use of either in surgical disorders.

P A R T I.

AN EXPLANATION OF THE EFFECTS OF
MOTION AND REST.

THOUGH the motion of the organs essential to life, may, of itself, maintain the vital principle in man for a considerable time, yet this motion is not bestowed upon an individual destined to live by himself; for, in man, the loco-motive faculty is almost as necessary to his existence, as that kind of motion on which life more particularly depends. This is so true, that a paralytic person left to himself would soon perish, although his organs of circulation, respiration, digestion, and those of the other several secretions, &c., should have preserved the faculty of performing their respective offices. Indeed, what sort of life is it that the unfortunate class of men enjoy who are afflicted with this disease, even when they are provided with all the helps which persons who feel for their situation can supply them? Some few individuals only excepted, they continue to exist, and that is all. If, therefore, the action of the external muscles, or the exertion of the loco-motive faculty,

be not absolutely necessary to life, they do, at least, contribute in a very evident manner, not only to its support, but also to its energy.

The effects of the exertion of this loco-motive power cannot, therefore, be indifferent in the cure of surgical disorders; they may facilitate or disturb this end as they are properly or improperly applied. The academy certainly expects from those who shall discuss the question proposed, an explanation of the cases and the times when it is necessary to forbid or to advise the exertion of this power. But to proceed with order in so interesting a subject, after having briefly exposed the effects of the motion of those organs whose action constitutes life, it will be proper to explain the share which the motion of those on which life does not immediately depend, has in the preservation, and if we may be allowed to say so, the perfection, of the vital principle.

The heart is moved and exhibits a succession of dilatations and contractions, by means of which the circulation of the blood is carried on. The arteries destined to convey this fluid, present the same phenomena to our view. But these actions diminish as they proceed, so that the contracting power which belongs to the arteries, and which is still so visible in small arterial branches, is, at length, reduced in their last subdivisions, in the lymphatic and serous vessels⁽⁶⁾ that are continued from them, and in the origin of the veins in which they terminate, into a kind of elastic power which constitutes the tone or spring of all our parts. This last is an imperceptible action, sufficing only to keep up the motion of the fluids, to preserve them in a fluid state, and to maintain life, which is the consequence of this fluidity.

The chest dilates and contracts itself alternately by the action of muscles, over which the will has but a very limited power of suspension or acceleration; so that respiration is habitually carried on without the concurrence of the will. The stomach is possessed of a power of contraction proper to the fibres that compose it; the intestines are endowed with a vermicular motion which is particular to them; in these viscera,

as in the liver, the spleen, the pancreas, the kidneys, the organs of generation, the brain, and most of the other glands, there are necessary secretions carried on, which are as much the product of the motion impressed by the heart on the fluids it supplies them with, as of that which they receive from the contracting power of these viscera themselves, which are far from being passive. It is indeed by their combined action that life is continued and maintained; but this is upon the supposition that the stomach is constantly receiving substances, proper to furnish materials, for the repairs required to supply the losses and decays that are the necessary consequence of excretion and motion. Under this supposition, each of the organs essential to life, will separate from the primary fluid, those liquids that are necessary for its support, and for the secretion it must perform, if it be a secretory organ. But in order that the primary fluid may supply materials fit for the repairing of the machine, and for the various secretions that are to be carried on throughout the animal œconomy, it is necessary that the crude materials extracted from the aliments by the juices subservient to digestion, and introduced by the lacteal vessels and the thoracic duct into the general course of the circulation⁽⁷⁾, should undergo some previous elaborations. These are brought about by the agitation of those materials, and by the friction and trituration that are its effects, and which fit them, at length, to associate themselves with other analogous materials, for the repairing of the machine in which they are destined to be employed. But in order that these elaborations may be such as are required, and that they may preserve in the animated machine the principle of life in its full vigour, it is necessary that the motion should be regulated at a certain medium indicated by nature^(d). Below this medium, the elaborations produced can only furnish thick, ill-concocted materials for the purpose of repairing; the cause of numberless obstructions, which, after they have gradually embarrassed the motions of the machine, at length destroy it. Above this medium, motion gives the reparatory substances a hasty elaboration, that brings them too speedily to that putrid decomposition which is their last period, and which consequently does not allow them to be employed for a sufficient length of time in the support of the machine. From

which it follows, that an excess of motion is liable to inconveniences directly opposite to those that are the effect of its deficiency; such are the disorders arising from the dissolution of our fluids, and the disunion of the globules that compose them, together with the various diseases and accidents that may spring from this general cause.

Nature, ever attentive to the preservation of that machine, in the construction of which she hath appeared to take so much delight, has provided for it in a manner as wise as it is admirable. Motion being the only way of preserving it, she hath at first given it a primitive, essential kind of motion, diffused throughout the whole animal œconomy, over which the will has no power, and which can alone entertain the vital principle in man; but if he were restrained to this motion alone, his life, far from being a blessing to him, would have been a fatal gift. The loco-motive faculty subject to the controul of the will, comes very seasonably to the assistance of this first kind of motion, the effects of which it is to complete, by exalting it to that medium which can only produce the proper elaborations for the support of the animal œconomy⁽³⁾. As the will is capable of putting this loco-motive faculty into action, it might also render it useless; but nature has provided against this, by submitting the animated machine to the imperious voice of want, in giving it passions and sensations. By these it is solicited, it is compelled to move, to direct itself towards the objects it feels itself inclined to, to search for them, and to labour in order to procure to itself the enjoyment of them. Thus it is by the sense of want that nature has chosen to furnish the machine she meant to preserve, with a supply of motion, absolutely necessary to maintain it in its entire state, during as long a continuance as it was designed for at its first construction.

The law of labour imposed upon us by the Author of nature, was therefore connected with the plan of our preservation; and that we might not infringe this law, he has made labour absolutely necessary for us. Unhappy are they who attempt to elude it! The numberless diseases they are afflicted with, and which are the characteristic of a life
reduced

reduced within narrower bounds^(c), expose them to a very severe penalty for the infringement of this sacred law.

But this secondary motion, subject to the controul of the will, and which comes so seasonably to the assistance of the first in perfecting the functions of the animal œconomy, may deprave them when it is carried to excess; it might even destroy them very speedily, had it no other restraint besides that of the will. For the imperious will, solicited by passions it is eager to gratify, and ever intent upon its object, would soon carry to excess the motion which is subordinate to it, and would imperceptibly strike the fatal blow to that machine for the preservation of which it was instituted.

But here again nature, as in every other instance, has been watchful to prevent the abuse; for, after motions too violent, or too long continued, she hath made the powers that execute them, disobedient to the call of the will. A kind of palsy, the effect of the animal spirits being exhausted, follows the too forcible exertion of the muscles, and makes rest necessary. Rest may be compleat or incompleat; compleat, when the loco-motive faculty seems to be in a perfect state of annihilation, and that the organs of the senses require to be excited by a stimulus more powerful than usual, from the substances which ought to affect them; this it is that constitutes sleep: incompleat, when the organs of the senses, restored, at the time of waking, to their natural sensibility, the loco-motive faculty, without being exerted, may be put into action by the slightest impulse of the will. This incompleat kind of rest is divided into general and partial; general, when this faculty is not exerted on any of the parts of the machine; partial, when it is put into action, to move only some of its parts.

Rest, as we see, is susceptible of many degrees, and hath advantages as real and as efficacious as those that result from motion. Rest is, indeed, the regulator of motion, and is intended to keep it in that state of equilibrium which constitutes health; or rather it is the loco-motive faculty,

culty, which being sometimes exerted, and sometimes suspended, becomes the essential regulator. What motion has destroyed or corrupted, is repaired by rest, and the disorders which may be occasioned by a too long continuance of rest are relieved by motion. It is during the intervals of inaction, or of sleep, which necessarily succeeds to labour, that the vital fluid, exhausted or corrupted by the effects of motion, is repaired and restored after all its losses; and that the liquids, too much agitated and attenuated by muscular action long continued, resume their former degree of consistence. From motion carried beyond the degree required, there must follow a dissolution, or a premature decomposition of the humours necessary for the support of the animal œconomy; and from excess of rest they must become too much thickened. Some reflections and facts will give the highest degree of evidence to these two assertions.

While motion, by the combination of its two kinds above mentioned, is kept in its due medium, the repairing materials conveyed every day into the general course of the circulation, are not more agitated and attenuated than they should be to unite themselves with others similar to them, and to be conveyed with these to the parts where they are to be employed. They do not mix or contract adhesions with materials of a different kind, except as far as is necessary to accomplish any views nature may have in bringing about such combinations. Each of these materials, which hath not contracted any improper connection, is readily and easily admitted into the strainers destined to receive it; all the secretions are properly carried on, and harmony reigns throughout the machine.

It is in this state of health, or of moderate motion which constitutes it, that some part of the fat and oily substances conveyed by the primary fluid, is continually deposited in particular divisions of the cellular substance, to form and keep up what we call a natural plumpness⁽⁹⁾. It should seem indeed, when motion is carried beyond this medium, that the repairing materials, undergoing a more powerful trituration, ought sooner to acquire that degree of elaboration which makes them fit to be

employed in repairing the machine ; but, on the contrary, excessive motion destroys this useful end, by forming between these materials that are of a different nature, cohesions and connections which prevent them from being deposited in a sufficient proportion for the support of the machine ; and such of them as may be deposited in a sufficient proportion, will too soon have attained that period which requires their being replaced.

In this state of excessive motion, which discovers, at least, a kind of dissolution in our juices, the oily part of the blood is either deposited in a very small quantity in the adipose cells, or is perpetually re-absorbed into the general course of the circulation, either to avoid the pernicious effects of too great a friction, or, in mixing, by the means of trituration, with certain depraved humours and materials, to facilitate their expulsion ; and that by reason of its oily smooth particles, which prevent the corrugation and contraction of the strainers through which these corrupted juices must pass. Thus we see that leanness is usually the attendant of excessive labour ; the continuance of it would necessarily bring on a complete dissolution of our juices ; but nature has put insurmountable obstacles to this fatal effect ; to wit, lassitude, and sleep which succeeds to it. During the latter, which is an image of the most perfect state of rest, the mass of humours, being only affected by that motion which is produced by the action of organs not subject to the will, the particles of similar materials, diffused throughout this mass and which have experienced a kind of separation, are endeavouring to reunite themselves, and to contract a new degree of coherence that may enable them to sustain the efforts of that motion which must increase at the time of waking. Fresh food, by furnishing recruits of crude and glutinous materials, contributes to strengthen this salutary cohesion, and to weaken the pernicious effects of motion too long continued.

It is so true that rest increases the consistence of our juices, that when it is excessive, by carrying this consistence too far, it produces evident marks of inspissation in some of our humours. It is chiefly among men

who live in a state of inaction and indolence, that we find that exorbitant fatness which bespeaks an habitual deposit of glutinous and oily juices in the divisions of the cellular substance. In such persons it is not necessary that this juice, in many respects so pernicious, should be taken up into the general mass to avoid the pernicious effects of friction, which they are far from carrying to excess by muscular action. It is among sedentary and idle persons that we usually observe those inspissations of the lymph, which occasion obstructions so difficult to conquer; and those nervous disorders so common in the present age, and which are evidently produced by the thickening of some of the juices of the animal œconomy. This may the more reasonably be presumed, as these affections are mitigated by the continued use of diluters, of warm bathing, which supplies a greater quantity of fluid to these inspissated juices, and of cold bathing, which, while it assists in this first intention, encourages, at the same time, their separation, by strengthening the tone of the solids that are to act upon them. We may add that these diseases are cured by a vigorous and continued exertion of muscular action, which, after it has restored these inspissated juices to their natural fluidity, is alone capable of maintaining them in it.

From what has been said, it follows, that motion has the property of attenuating our fluids, and of keeping them in a state of fluidity proportioned to the active cause. This fluidity may be either too great from the too violent and too long continued exertion of the agent that produces it; and, in this case, it is called dissolution, and the machine is exposed to those disorders which arise from this kind of cause; or else this fluidity may be less than the necessary degree, which may proceed from the weakness or inaction of the agent that should keep it up. In this instance, the want of fluidity takes the name of inspissation, and the disorders manifested in the animal œconomy, are such as are produced from this kind of cause.

P A R T II.

EXPLANATION OF THE INDICATIONS WHICH ARE TO LEAD
US IN PRESCRIBING THE USE OF MOTION AND REST IN
SURGICAL DISORDERS.

FROM the short account we have been giving of the necessity of motion, and of its effects, it will not be difficult to discover the indications which are to lead us in prescribing or forbidding the use of it in surgical disorders. If it be required to resist or prevent the inspissation of the fluids in the cure of these disorders, it will be necessary to call in the assistance of motion, provided there be no particular circumstance that may render the use of it improper. If, on the contrary, the plan of cure require to give a better consistence to the fluids, and if the effects of motion should counteract this plan, we must have recourse to rest. We shall be in no danger of making an improper application of these two curative methods, if we can settle our ideas upon the advantages that attend them, by facts and instances supported with proper reflections; and in order to throw this part of our essay into some method, we will divide it into two sections. In the first we shall expose the indications which are to determine the use of motion; and in the last, those in which rest is to be prescribed.

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S E C T I O N I.

EXPLANATION OF THE INDICATIONS WHICH ARE TO LEAD
US IN PRESCRIBING MOTION FOR THE CURE OF SURGICAL
DISEASES.

AMONG the several surgical diseases in which experience has established the necessity of motion, we find, that they are all produced by the inspissation of some of our fluids. The gout, the rheumatism, anchyloses beginning or formed, stiffnesses of the joint, all proceed from this cause. The gout indeed, that cruel and common disorder, which scarce ever visits the cottage of the poor man, but whose ordinary residence is in the midst of luxury and opulence, discovers, in all instances, an evident inspissation of the lymph. The kind of serum which circulates, being no longer able to preserve, in a state of dissolution, all the earthy particles it conveys through the lymphatic vessels of the ligaments and aponeuroses that surround the extremities, as the feet and the wrists, deposits there some of these materials. These, losing that globular form which they had in common with the fluid that served as their menstruum, become irritating bodies, the action of which, upon aponeurotic parts of extreme sensibility, occasions those acute pains that characterize

characterize this disease. Nature, it is true, generally succeeds in dissipating its paroxysms by a process of greater or less continuance; but this process is nothing more than an increase of motion, which manifests itself, first, in the part affected, by the swelling, pain, and inflammation we observe in it; then in the whole habit, by the fullness of the pulse, and the evident fever that often accompanies this disease. It is by means of a similar increase of motion, that nature, at length, prevails, in comminuting and attenuating the earthy materials that are deposited, so as to render them fit to be remixed with the fluids accumulated in great abundance about the seat of the pain, and thus to facilitate their expulsion through all the natural channels of excretion. Nothing can be more easily proved than that these disorders proceed from want of motion, nothing is more evident than that they are relieved by an increase of it; and I shall now proceed to shew that increase of motion will also prevent them.

The rich, over whom the gout more particularly exerts its dominion, living in the midst of idleness and luxury, seem to be affected with a demi-palsy; though they are in possession of the loco-motive faculty, they do not put this power into action; the law of labour seems not to have been imposed upon them, at least it is become a habit with them to elude it. These beings are therefore almost reduced to that radical kind of motion which is independent of the will; the other kind which is subject to its influence, and which ought to compleat the effects of the former, so as to give the repairing substances the necessary degree of elaboration to maintain health, is never sufficiently exerted by them to obtain this effect. The imperious call of want, which urges this second kind of motion, is never heard by them, and deprived of this salutary incitement, they live in a state of indolence, the sweets of which are deservedly embittered by their effects.

With these Sybarites, accustomed to high living, motion is, in general, not sufficiently exerted, to give to the quantity of crude materials constantly admitted into the course of the circulation, a degree of elaboration

tion perfect enough to form none but proper nutritive juices, and to expel the remains of those that have been spoiled by time and friction; from which, it necessarily follows, that there must be some depraved humours remaining. These being deposited upon certain parts, produce in them diseases more or less acute, and more or less dangerous, in proportion to the difference of the texture and sensibility of those parts. These deposits usually taking place in the feet, the wrists, and the knees, form the gout, which, as we see, is the evident consequence of motion not being sufficiently exerted to keep up that fluidity of the humours which constitutes health. If old people be more tormented with the gout, it is because gluttony and indolence usually increase in an advanced age, and that at a time when the suppleness of the parts and the diameter of the lymphatic vessels are diminished, circumstances which contribute to encourage those deposits of cretaceous matter that are the evident cause of this disease.

Young men, though rich and voluptuous, are exempt from the gout. For, besides the natural suppleness of the fibres in early life, the faculty of motion is excited in them by such a variety of passions, that it supplies that action which want renders necessary in less fortunate persons. The game of tennis, dancing, hunting, fencing, and riding, are exercises which prevent the bad effects of the want of motion among persons of this description; but, at the age of thirty, these wholesome exercises no longer make a part of their plan of amusement. On the contrary, their present games scarce require that they should speak or move their fingers; and accordingly the gout was never so general as at present, even at a time of life when it was formerly unknown. It is evident from what has been said, that want of motion is the principal cause of this disease; the work of nature, in relieving its paroxysms, allows us no room to doubt that the salutary crisis which dissipates them is owing to an increase of motion. This must therefore certainly be the best method of resisting or preventing the gout, and the indications which direct the employment of it in the cure of this disease, are too precise to be mistaken. Besides, experience has so frequently established

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the efficacy of this method, that it would be almost useless to bring facts in support of the truth of this assertion; yet as these carry with them complete conviction, and as they are the touchstones of just or false reasoning, I shall produce some instances, in which this mode of relief has been employed with a success so pointed, that it is impossible we should not distinguish the views of nature in the use of it⁽¹⁰⁾.

A man who had led a very active life till he was thirty years of age, was, at that period, engaged in a sedentary employment. A few years after he felt some slight attacks of the gout which seized him every six months. These became afterwards so sharp and so lasting, that at fifty years of age he was cruelly tormented with it. The fits lasted five or six weeks, and returned three or four times in the year; neither had the remedies he had tried at different times procured him any sensible relief. The feet, the wrists, and the knees were the ordinary seats of the disease, which, at fifty five years of age, notwithstanding he led a very sober life, had reduced him to a very miserable state. Being strongly persuaded that the painful life he had experienced for twenty years past, was owing to the little exercise his employment admitted of, he purchased at that time a garden out of town, fully determined to be his own gardener. As he delighted in flowers, he employed himself in the cultivation of them, and laid a plan of hard work for himself during several hours every day. He kept his resolution, so that for a number of years there were few days in which he was not obliged to change his linen several times in the day, in consequence of the profuse sweats he was thrown into by his strong and continued exercise.

The first year he felt a change which encouraged him to proceed; and at the second year, sound and quiet sleep, a constant appetite, and an uncommon agility, the inseparable attendants on health, succeeded to all those infirmities he had before experienced. He arrived to the age of fourscore without bearing any marks of decrepitude, and still continued to work in his garden, even in winter time. But a fore leg, in consequence of a burn, having confined him for a long time to his room in
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the year 1776, he has since been attacked with a terrible jaundice, which has terminated in a herpes that may probably be still dissipated by motion and the labour he is beginning to resume.

A young man, very fond of tennis, and who frequently indulged in this exercise, having quitted it almost entirely for several years, to follow a profession which was rather inconsistent with this kind of dissipation, was seized at the age of thirty with pretty smart fits of the gout, and which returned at very short intervals. These fits became more and more continued and painful, notwithstanding he observed the most regular conduct and the strictest regimen. I advised him to play again at tennis, to the leaving off of which I attributed the appearance of this disease at an age when one is usually exempt from it. He contrived his business so as to be able, three or four times a week, to allot two or three hours to this exercise. This succeeded at first in lengthening the intervals of the fits, and diminishing their violence, and at last made them totally disappear; for during some years past he has not felt any return of them. It would be needless to alledge any other facts to prove the necessity of motion in the cure of the gout; the instances which establish the advantage of this method are too numerous and too well known to leave us any room to doubt of the propriety of employing it in this case⁽¹¹⁾.

The rheumatism differs from the gout merely in the seat of the obstruction, which takes place in the aponeuroses of the muscles in their sheaths, and in the strainers of those membranes that surround and connect them. This obstruction being, as in the gout, the effect of an evident inspissation of the lymph that is conveyed through the channels of these parts, motion must necessarily be also the proper agent in this case. It must therefore be employed to restore these inspissated humours to the degree of fluidity required for their free circulation. Accordingly we see, that if the persons who are attacked with the rheumatism, have resolution enough to bear the very sharp pains always occasioned upon first moving the part affected, they soon contrive to get rid of them en-

tirely by very powerful and long-continued exercise, which putting the part affected in action, produces in it a salutary agitation and attenuation of the humours forming the painful obstruction⁽¹²⁾. Even in those cases where the pains are too violent, and muscular action too much benumbed to admit of vigorous motion in the part affected, the best curative means are still to be chosen from among those that stimulate the solids and fluids of the part. These are, either warm or cold bathing, which, besides facilitating the attenuation of the humours by the introduction of aqueous particles that may possibly be conveyed so as to mix with them, do also excite motion in them; cold baths, by increasing the tone of the solids; warm ones, by the rarefaction they produce in the fluids. Stupes add to these effects, already so efficacious in themselves, the power of breaking mechanically the inspissated juices by the shocks and strokes they carry along with them. The juices are, as it were, kneaded by this agent, which from its soft, mild, and uniform method of acting, is much to be preferred to the other external methods employed to produce this effect; such, for instance, as dry frictions upon the part, flagellation with nettles, &c. — If these kinds of means are sometimes attended with success, it is evident this must happen by their conveying into the painful part a degree of motion fit to attenuate the humours that formed the obstruction, and induce them to a change of place. This reasoning may be extended to those large blisters successfully applied to limbs affected with the rheumatism; it is as much by the motion they excite in the part, as by the discharge of serum, and the suppuration they occasion, that they produce those salutary effects they are often attended with.

An ankylosis appears to be nothing more than a gradual inspissation of the synovia, by which, bones originally designed to move freely upon one another, become consolidated. The curative indication that presents itself here is to counteract this inspissation while it is forming, and to restore the synovia to its first state of fluidity, when it hath acquired a preternatural consistence which confines and even destroys the motions it was destined to facilitate: but what are the means by which this indication

cation is to be fulfilled? Which is the kind of remedy that experience hath determined to be the most successful in these cases? It is the motion of the parts composing the joint, which by acting upon the thickened synovia, by rubbing and triturating it, restores to it that fluidity it had lost. The indications for the use of this method are indeed so pointed in this sort of ankylosis, that it cannot be supplied by any other; but there are other kinds of this disease in which there are evidently counter-indications that oppose themselves to the application of it; and in others again, there is as much precaution as skill necessary to direct the employment of it. A hasty review of the chief causes of this disease will be sufficient to direct the proper application of motion in its cure.

The ankylosis may be the effect of too long-continued rest, of too great inaction of the bones destined usually to move on one another, and then it will be sufficient to restore by degrees these bones to their ordinary motion, either by the action alone of the muscles that are inserted into them, supported with a degree of firmness necessary to overcome the painful sensation of the first motions, or by increasing that action by external powers. It seldom happens, however, that inaction alone, even though continued for a considerable length of time, can produce this disease. Its most usual causes are, the diseased state of the bones, either on their articular surfaces, or in the neighbourhood of the articulations, the inflammation and tension of the ligaments that strengthen them, and of the muscular aponeuroses that cover them. It may be observed indeed, that in the diseased state of the articular surfaces of the bones, the ankylosis may frequently be considered as the resource of nature for the preservation of a limb she is not willing to lose; and in these cases we ought to be so far from resisting the progress of this disease, that our art must be exerted in encouraging it by every possible means⁽¹³⁾. It may here well be presumed that motion is not to be employed to bring about this salutary end, as I shall shew hereafter, when I shall expose the indications which direct the use of rest in surgical complaints. But setting aside these circumstances in which an ankylosis may be considered as an advantage, motion must be the curative medium most to be depended upon

upon in these cases, if we employ it with all the precautions required by the difference of circumstances. We may even have recourse to it with confidence in those cases which seem more particularly to forbid the use of it.

Fractures of the joints, for instance, by occasioning an extravasation of bony matter into their cavity, seem at first sight to make an anchylosis unavoidable, and yet, in these cases, motion employed with skill may frequently prevent it. To be convinced of this from theory, we have only to trace the mechanism by which this extravasation is made in most circumstances. If the bones, fractured at their extremities in the joints, have not experienced any evident change of position, or if they have been replaced in their original situation by the Surgeon's art, the bony matter exuding from the surfaces of the solution of continuity, tends, as in other instances, to consolidate the divided parts, in order to restore them to their functions. It is true, indeed, that the bony matter, being extravasated, exceeds the level of the parts brought into contact, and that as it thickens, it forms a solid mass on the divided part, and that this mass, on the side of the cavity of the joint, must be so much the more considerable, as the bony matter must have met with less opposition in its growth; but it by no means follows that an anchylosis must be the necessary consequence of this. Motion may be employed with advantage to prevent this accident, and the bony projection which threatens the joint with it, indicates, by its very formation, the employment of this method, which can never act more effectually than while the callus is still soft. For this reason, when we may presume that the fractured pieces have begun to acquire a certain degree of coherence among themselves, by means of the bony matter that must consolidate them, it will be necessary to give gentle motions to the joint, and to repeat them as often as circumstances will permit. It is evident that the projection of the callus, which is still yielding, will be restrained, and that at length the play of the articulation will be perfectly restored. Supposing however that the projection had acquired a considerable degree of consistence, we must not, on that account, abandon the joint to the anchylosis that may threaten

threaten it. This circumstance can only render the use of motion more painful and more difficult ; but by persevering in the use of it, and by combining it with that of diluting and relaxing applications, calculated to diminish the force of the pressure of the articular surfaces one against another, we shall at length succeed, if not in levelling entirely the bony projection, at least in rendering it so smooth and polished that the motion of the joint shall no longer be impeded by it.

What is thus dictated to us by reason, I have observed more than once confirmed in fractures of the olecranon, which is evidently adapted to the articulation of the arm with the fore-arm. If an ankylosis be frequently the consequence of this accident, this is less to be ascribed to the nature of the fracture, than to the want of skill in those who treat it. It is true, that if, in this case, we put the fore-arm in a bent situation, and in a sling, the olecranon being then fixed by the extensor muscles that are inserted into it, while the rest of the cubitus forms a right angle with the humerus, there will necessarily remain a considerable interval between the two fractured pieces. In these cases, the exudation from the fractured surfaces being discharged into the cavity of the articulation, and afterwards consolidated there, would, from this reason alone, destroy the power of its motion ; but even if this exudation, without stretching into the cavity of the joint, should only fill up the space between the cubitus and its apophysis, and that simply by moulding itself on the correspondent part of the humerus, the ankylosis would no less be the necessary consequence of an addition that should have lengthened the natural unciform process formed by the olecranon ; for the extremity of this process, resting then upon the bottom of the cavity that is found in the posterior part of the humerus, we never can hope to make any extension of the fore-arm, and it must therefore necessarily remain in the state of flexion in which it hath been placed⁽¹⁾ ; but if, instead of using this manœuvre, so opposite to all the rules of art and of common sense, we keep as much as possible the fractured parts in a state of approximation, by a constant and moderate extension of the fore-arm⁽²⁾, and by a suitable bandage, then the exudation which proceeds from

the corresponding bony surfaces, as it condenses, does nothing more than unite the olecranon to the body of the ulna from whence it was separated, and that without any visible increase of length. In this case, the callus would only form a trifling projection on the side of the articulation, which might, however, confine the motion of the joint, if it were not kept under. But if we give the joint a little motion towards the twenty-fifth day⁽⁴⁾ after the accident, before the callus be completely hardened, and if we increase this motion by degrees, this projection will give way, and in a few months the joint will recover all its motions, as I have been convinced by some cases of this kind in which I have followed the practice here laid down.

It may, however, be observed, that after the olecranon has been united by the skilful methods required in fractures of that bone, any difficulty of motion that may exist, may proceed either from the mass of the callus on the side of the articulation, or from the projection of one of the pieces of the bone itself, by reason of the difficulty, not to say the impossibility, of keeping them on a level. But whether it be that these causes act separately, or in combination, to restrain the motion of the joint, we may readily conclude from what has been said, that motion is the only power that can be employed with advantage, in removing these inconveniences, and in restoring the joint to its original freedom. This is effected, at length, by polishing and wearing down, either the hardened callus itself, or the bony particles projecting in the cavity of the joint. The only circumstance to be attended to is, that in the last case, as the first motions must necessarily be more painful and difficult, it will be proper to be more careful in the employment of them, than in the other instance.

If motion be almost a certain remedy against an ankylosis threatening the joint in most of the fractures incident to it, we are not to expect less effect from this remedy, when a rigidity is likely to ensue from a compound fracture, with splintering of the bone, in the neighbourhood of an articulation. As the stiffness of the joint, in this case, can only proceed

need from an inspissation of the synovia, and from a rigidity, the ligaments and aponeuroses surrounding the joint may acquire, motion may be considered here too as the means to prevent an ankylosis. But if we consider that the state of the parts which leads us to apprehend this inconvenience, is the consequence of their tension, inflammation, and disposition to suppuration, as also of the long inactivity they must be kept in, in order to accomplish the first indication which is the cure of the fracture, we shall conclude that the ankylosis, in this case, is but a secondary accident which must not be attended to, at least, for some time. Motion is undoubtedly the proper remedy in this case too; but previous to our having recourse to it, it is necessary that the consolidation of the bony parts should be considerably advanced; and that the inflammation and irritation of the ligaments and aponeuroses should so far be overcome, that motion may not produce in them a painful extension which might tend to excite the inflammation afresh, and to form abscesses in the part. As soon as these chief indications are obtained, we must call in the assistance of motion to prevent the ankylosis with which the joint is menaced. If the articulation be still susceptible of an evident degree of mobility, its own motion alone excited and increased by degrees, will, in time, restore to the ligaments and aponeuroses their flexibility; and to the synovia its ordinary fluidity. But if the synovia have acquired too much consistence, and that the inspissation of the fluids which fill the canals of the ligaments and aponeuroses, should have made them too rigid to admit of being put in motion without causing very great pain, we must then avoid persisting too obstinately in the use of this method. I have seen considerable swellings and ecchymoses brought on after an inconsiderate use and exertion of motion under such circumstances; these have made it necessary to postpone for a long time the use of this efficacious method, which had failed only from the neglect of precautions proper to have insured its success. In these cases the motion of the joint must be prepared and preceded by oily and saponaceous embrocations⁽¹⁵⁾, by warm and emollient baths, and especially by stupes. These remedies, by transmitting a gentle motion among the inspissated juices, and even by beginning their liquefaction through means of the penetrating particles

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they may convey to them, are capable of supplying the ligaments and aponeuroses, and are therefore excellent means to be employed previous to that motion which is to restore to the joint its free play, and get the better of the anchylosis.

Stiffnesses of the joint which continue for a long time after sprains, luxations, and fractures, even at a distance from the articulations, are also produced by an inspissation which is the effect either of the compelled stagnation of the fluids during the obstruction of the parts affected, or of the continued rest to which they have been confined in order to fulfil the most urgent indications which these disorders present. In these cases too, motion either alone, or combined with other auxiliary methods I have before mentioned, is the effectual remedy to remove these rigidities⁽¹⁶⁾. In a word, whatever may be the distant cause from which these accidents may be produced, their apparent cause consists always in inspissated juices, which cannot be restored to their first state of fluidity without the assistance of motion; either internal motion excited by remedies adapted to the cause of the inspissation, or external motion produced by muscular action.

From the facts already recited, which are well known to all the profession, we are sufficiently authorized to conclude, that wherever there is any diseased inspissation, we must have recourse to motion to correct it; but other facts will give the highest degree of evidence to this assertion. Every thing persuades us that the scrophula, for instance, one of those diseases in which this inspissation is most remarkable, is produced by want of motion in the persons who are affected with it.

Infancy, which is usually the season of this disease, is indeed the time when motion is most exerted in the machine; but it is not without necessity that this principle is carried so high at this period. The nature of the food of a new-born infant, the rapid growth he is to experience, the extent of surface he presents, in proportion to his size, to the fluid in which he lives; all these circumstances require in him a

much greater degree of motion than at any other age. The only nourishment nature has provided for him, must be of an acescent quality, so that to keep the fibres in a state of suppleness favourable to their extension, a considerable degree of motion was required in this living machine, in order to animalize, as it were, this kind of food, and to extract from it the materials proper for the growth of the body. This same motion was not less necessary to supply a degree of heat that should enable the child effectually to support the freshness of the air with which he is surrounded. For these reasons, the contractions of the heart and arteries in earliest infancy are extremely frequent, and muscular motion very quick. At this period then, as at every other time of life, there exists no greater degree of motion than is requisite for the wants of the animal œconomy; and therefore this principle cannot be interrupted or exerted above its powers without producing an alteration in its effects.

While the child draws from his mother's breast the food nature has allotted to him, while he freely enjoys the faculty of moving as much as his muscular powers will allow, his fluids are neither altered by inspissation nor dissolution, and he remains in health. But if for this wholesome food we substitute one that is made with unfermented flour, and if this aliment, pernicious in itself, be also given to excess, the child will not then enjoy a degree of motion sufficient to give the nutritive juices, extracted from such glutinous food, the elaborations necessary to maintain health. Hence will at length result a fault of inspissation, the progress of which will be more rapid, as external or muscular motion shall have been more confined by swaddling cloaths, and therefore less able to second the effects of that motion which is primary and essential to life.

Under these circumstances nature seems indeed herself to have recourse to motion in order to restore the humours to their proper fluidity. Restlessness, agitations, pain, and fever, which bespeak an increase of motion, are so many means she often employs with success in children to resist the acescent property of their fluids, and the inspissation produced by it. But these means are far from being always effectual; there

are children who perish speedily after such exertions; others, after having languished a long time under obstructions of the mesaraic glands, die at last of the suppurations that are formed in them: others again, are seized with obstructions in the glands of the neck, or other external signs which indicate a scrophulous habit. This disease, as terrible from the difficulty of cure as from the accidents that attend it, seems, from the symptoms that manifest it, to be produced by too great a degree of acescency in the humours, which not being sufficiently agitated to correct this disposition, an inspissation of the lymph is produced, which forms the characteristic of the scrophula. Nature seems of herself to point out the remedy, by manifesting an increase of motion in all the efforts she makes to counteract this disease. It is therefore by consulting this wise directress, who never deceives us when we understand what she intends, that we may presume, that motion is one of the means, the efficacy of which is most to be depended upon in the cure of scrophulous complaints. Facts, far from invalidating our ideas upon this head, seem to add a fresh degree of probability to them. Do we not indeed observe, that all dissolvents of the lymph (such as *Rotron's*) composed of alkaline, absorbent, and gently irritating substances⁽¹⁷⁾; that repeated purgatives, that mineral and saponaceous waters, &c., which succeed best in the treatment of this disease; in a word, that all these remedies act no otherwise than by increasing the motion in the machine to a higher degree than before their use? Some of them too, it is evident, tend to subdue the acrescent quality of the liquids, which is one of the principal causes of the inspissation of the lymph, as much by the motion they excite, as by the alkaline and absorbent particles they contain⁽¹⁸⁾.

The topics also applied with success upon scrophulous tumours, and distinguished by the name of dissolvents, such as the *Emplastrum de Vigo*, *Diabotanum*, &c.⁽¹⁹⁾, seem to act no otherwise than by increasing the power of motion in the obstructed part. Nature herself, when she cannot by her own powers, or with the assistance of art, dissipate these tumours in an insensible manner, doth she not effect the dissolution of them by calling in the aid of inflammation, and suppuration⁽²⁰⁾, which is the consequence

quence of it? These two agents which she employs to complete her purposes, are they any thing more than the produce of an increase of motion? But the circumstance which evidently demonstrates the efficacy of that principle in the cure of this disease, is, that the remedies adapted to it are never more successful, than when they are combined with strong and continued exertions of muscular motion. This is so true, that with the use alone of some common dissolvent, and a few purgatives administered now and then, joined to that of vigorous exercise taken in the country and in the open air, I have succeeded in curing several young persons affected with scrophulous tumours in the neck, feet, or fingers, some of which, in the latter instances, were attended with fistulous ulcers and caries of the bones. But these means must be continued for a sufficient length of time, to enable the lymph to be restored to its natural state of fluidity, and to be maintained in it; and during the employment of them, we must forbid the use of milk, and all kinds of acid food.

The venereal virus also, which, from every circumstance, seems to be a coagulator of the lymph, and which bears some analogy to the scrophula, since it frequently degenerates into this, appears to require no other remedy than a certain degree of motion excited and kept up for a sufficient length of time to destroy and annihilate the effects of this poison. Mercury used in frictions, the aquila alba, the panacea, the sublimate, and all the other preparations of this mineral internally taken, the sudorific woods, &c., do not exhibit in their effects any thing else but an increased degree of motion throughout the machine. Nor can the volatile alkalis, proposed by Mr. PERILHE⁽²¹⁾, be used upon any other principle in the cure of this complaint. Nature seems not to proceed any otherwise in her efforts to destroy the virus, and to prevent its being communicated to the general mass, when it hath originally been confined to some part. Inflammation, and pain that attends it, and suppuration, which is the effect, are the means she opposes to the propagation of this terrible disease.

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I have seen gonorrhœas cease of themselves, and venereal buboes, abandoned totally to nature, perfectly healed after a plentiful suppuration, and the persons affected with these complaints have not afterwards experienced the least venereal symptom, though they had not made use of any mercurial remedy. I have seen a man radically cured of the most dangerous venereal symptoms, for which he was intending to undergo a salivation, at the end of a putrid fever that lasted forty days, and the crisis of which was obtained by very copious and long-continued sweats.

Mercury and its preparations are not then the only antidote to the venereal virus; every thing that can exalt the motion of the machine to a certain pitch, and maintain it there for a sufficient time, may be used with effect in this case to resist the inspissation of the lymph, and the cause which produces it. Muscular motion, as it cannot be continual, is scarce able to have this effect; but though it may not, of itself, have power to destroy the virus, it is no less certain that it may assist in preventing the progress of it. It is from observing its good effects in venereal affections, that I scruple not to combine it with the use of mercurial medicines, which increase internal motion. I therefore always desire my patients to use a great deal of exercise, while I treat them with mercurial frictions. Though the weather may be rather cold, I do not confine them to their rooms, and have never had any reason to repent of this method. There have been some patients even, who though they went out every day, and took a long walk, morning and evening, have never had the mouth heated, notwithstanding they had used as much as eight ounces of ointment in the usual quantities.

The scurvy not being entirely a surgical disorder, ought not, perhaps, to be noticed here; yet let me be permitted to expose some of the phenomena this disease presents us with in its various stages; because they will form, in regard to what has been said concerning motion and its effects, an additional degree of probability by which it would be difficult not to be convinced. In the first and second periods of this disease, every thing indicates too great an inspissation in the fluids of the persons who
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are attacked with it. Lassitudes, languor, swelling and hardness of the lower extremities, are all symptoms that characterize such a state of the fluids; and cold and damp weather, inactivity, and the use of gross glutinous food, which are the distant causes of this disease, can scarce produce any other kind of vice in the habit. Accordingly in such a situation, what are the curative intentions, and by what means are they to be fulfilled? They consist evidently in exciting the tone of the solids, attenuating the fluids, and restoring them to their usual fluidity. Internal motion, increased by certain remedies that have the power of exciting it, and the exertion of external motion, seem to be the proper means of obtaining these ends.

Now, if we consult facts, we shall find that daily and moderate exercise, exerted so as to bring on a gentle perspiration, that the juice of plants which contain a volatile alkali already formed, that the Peruvian and Winter's bark, that wine and antiscorbutic syrups composed of these plants and of alkaline salts, that blisters, in a word, are all remedies of remarkable efficacy in the first and second stages of the scurvy. It hath even been observed that all the symptoms that denote this disease, have not unfrequently disappeared after a fever continued for a few days. It is evident then that motion is the means employed by nature and by art in opposing this disease; but to that state of inspissation which is the character of the first and second degree of the scurvy, there frequently succeeds a state of evident dissolution in all the fluids. In this case the curative intention and the means of accomplishing it must be adapted to the change the disease hath undergone. Hot antiscorbutic medicines, and blisters, so efficacious in the first and second stages of the scurvy, become prejudicial in this more advanced stage, in which dissolution hath succeeded to inspissation; and a fever is then the most dangerous accident that can happen to the patient; for a dissolution carried to its utmost height, and death which follows it, are the speedy consequences of such an event.

The remedies that succeed best, at this period, are derived from the class of substances which contain a mucilaginous principle, susceptible of a slightly acedent fermentation, calculated to give some degree of consistence to the liquids, and to restore the solids by degrees to their proper tone. Oranges, lemons, fresh vegetables slightly acidulated, new bread, ripe fruits, grapes, warm wine, honey, &c., are the remedies which seem more particularly to possess this property. Motion, so salutary in the first stages of the scurvy, becomes now very dangerous; for it hath been observed in the third, and more especially in the fourth, stage of this disease, that several patients have died of internal hæmorrhages, after having inconsiderately used exercise which, though moderate in itself, was still above their strength; after having made some sudden motion, or after having been only stirred with quickness, and moved incautiously from one place to another.

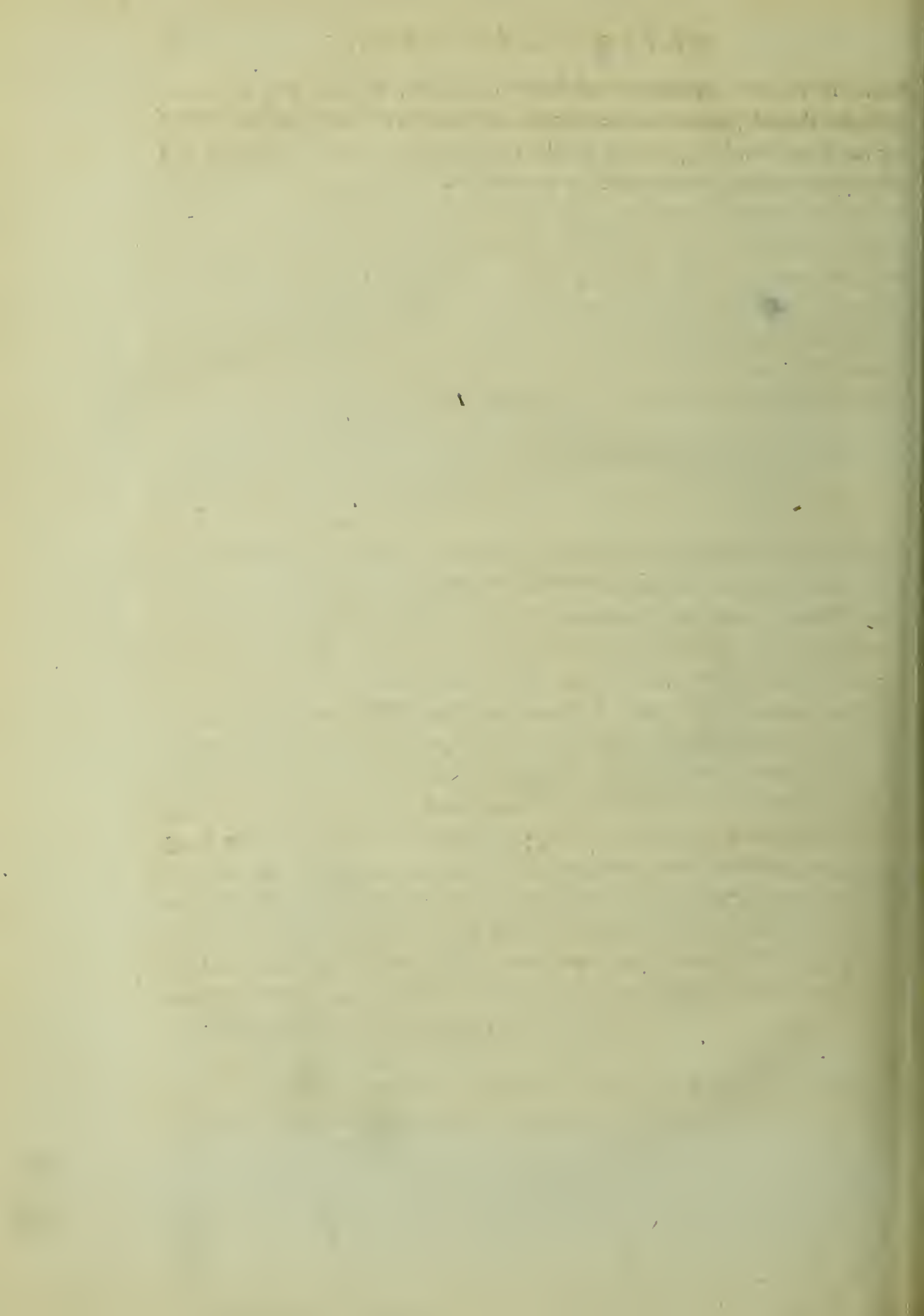
But this state of extreme dissolution that the scurvy offers at this period, is seldom found among persons who live upon land, except in prisons and dungeons, where inaction, cold, dampness, bad food, and affliction, often contribute to carry this disease to its highest period; for among the common people, even among those who live most poorly, the scurvy seldom shews us any thing more than a vice of inspissation, against which external motion, combined with warm antiscorbutics, may be employed with success. Accordingly in those obstructions of the legs, which have a purple cast, with hardness, and which are deemed scorbutic, so far from its being necessary to prescribe rest, as in other obstructions of these extremities; exercise, on the contrary, and walking in dry and warm weather, combined with the remedies suitable to the scurvy, have always appeared to me the most proper means of relief; and I have often observed that these obstructions were less considerable, and less shining towards the evening, after a good deal of walking, than two or three hours after the patients had got out of bed.

From what has been said, it appears, that the indications which lead us in the application of motion to the cure of surgical disorders are evident.

dent. If we must attenuate and divide the fluids, if their too great inspissation should produce a real disease, or form an obstacle to the cure of any one ; motion becomes one of the most certain curative methods, the efficacy of which is established by experience.

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S E C T I O N II.

TO SHEW THE INDICATIONS WHICH ARE TO
LEAD US IN PRESCRIBING REST FOR THE CURE
OF SURGICAL DISORDERS.

THE effects of rest and motion being, as we have observed in the first part of this essay, as diametrically opposite as their causes, and the too great inspissation of our fluids affording us a precise indication for the employment of motion, we might immediately conclude from hence, that whenever it becomes necessary, in the cure of surgical complaints, to increase the thickness of these same fluids, or any of them, it will be proper to call in the assistance of rest. This is a very natural consequence which should seem to point out both the cases which require the use of this method, and the indications which are to lead us in prescribing it. But in order that this consequence may be admitted, it becomes necessary to support it by facts, which present themselves in great numbers. In all fractures, for instance, where the advantages of rest are so evident, nature seems to require nothing but an inspissation of some of

our liquids. Is it not by the gradual concretion of a juice originally fluid, that she unites in the most solid manner, the bony parts that have suffered a solution of continuity? Is not this desired effect chiefly brought about by rest, and doth not motion put the greatest impediment to it? This circumstance is universally known, and not contradicted by any fact; but there are many other cases, in which nature appears to have the same views as in fractures, and in which the indications for rest are as precise as in these accidents. These cases, though not unfrequent, require a degree of attention and penetration to distinguish them, and it is by taking a review of them, that we shall find rest to be frequently the most certain method that art can furnish to the surgeon who knows how to apply it.

In my first anatomical pursuits, I had seen some spines of crooked persons, that presented three or four dorsal vertebræ, the bodies of which were soldered and confounded together, without having paid any particular attention to this disease, and without having reflected on the accidents it might have produced during its continuance; but a patient whom I saw at the Hospital in 1766, fixed my observation upon this object. Having been violently beaten, at the age of thirteen, by his father, he felt, a few months after, a weakness in the spine, attended with pain and a difficulty of keeping an upright posture. He at first walked with great difficulty, and afterwards could not walk without leaning upon a stick, with his body bent forwards. These first symptoms which continued more than six months, were followed by a fever accompanied with difficulty of breathing, and pain in the middle of the back, without any very apparent swelling externally. These symptoms were relieved by bleeding and other remedies, and the patient seemed restored to his former state; but the difficulty of walking and of supporting himself increased by degrees, and, at length, a tumour was formed towards the lateral and posterior part of the last false ribs, the increase of which was very slow, and made no change in the colour of the skin. This tumour extending itself gained the region of the loins, and more than six months after its appearance, the skin became inflamed, grew thin, and
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by the assistance of maturing poultices applied to the tumour, a fistulous opening was made in it, from whence there issued, according to the patient's account, more than a quart of matter as white as milk. This discharge having continued very plentiful for three months without hopes of cure, the parents, tired with the length of the disease, took the resolution of sending this young lad to the Hospital. When he came there he had a fistulous opening on the right side of the lumbar region, which furnished an ichorous and plentiful discharge; a slow suppuratory fever accompanied, and every appearance seemed to shew that death would soon terminate this disorder. A pledgit of soft ointment only was put upon the fistulous orifice, and the disease was left to nature.

I frequently saw this patient, who being better fed, and more attended to than at home, began to recover a little from the deplorable state to which he had been reduced. He particularly kept very quiet in his bed, and his spine was then incurvated with an evident projection outwards, towards the last dorsal vertebræ. About two months after he came into the Hospital, the matter which oozed from the fistulous opening, grew thicker and less plentiful, the countenance appeared better, the pulse less frequent, and he began to give some hope of recovery. This hope was more confirmed six weeks after, for the discharge was still lessened, and the patient began to feel some degree of strength in the spine. Two months after this last period, the fistulous orifice was closed, and the patient began to walk with a stick; but he was crooked, and seemed to have lost much of his former height.

From the accidents this patient had undergone, and the deformity the spine had contracted during the course of his disease, I imagined that some of the dorsal vertebræ had been affected with caries; that the remains of them after being confounded together, and after having been in a state of granulation, had at length acquired a degree of solidity sufficient in some sort to supply the bodies of these bones. I could not but consider rest as having been the chief promoter of this salutary end; and

and subsequent facts appear to have completely confirmed my conjectures on this point.

First, the patient who had been the subject of the preceding observation, and whom I had always kept within my notice, having been seized in 1769 with a peripneumony of which he died, I was allowed to inspect the body, and my first care was to take notice of the disorders the spine had experienced three years before. I found, as I suspected, several vertebræ, the bodies of which were confounded with each other; these were the ninth, tenth, and eleventh, of the dorsal vertebræ, which had lost at least half of their longitudinal dimensions, while their spinal processes which had not suffered the least alteration, formed a projection and a remarkable convexity outwards. This first part of my conjectures being verified, I have neglected no opportunity of informing myself, what share rest might have had in these sort of cures. Accordingly I have questioned all deformed persons, whenever I could do it with propriety, and desired them to give me an account of the accidents that had happened to their spine previous to its deformity. Those who are become so, merely from a lateral projection of this column, without having had any collection of matter during the growth of this projection, or after it was formed, have scarce complained of any thing more than a gradual weakness of the part affected, and have never been obliged to keep from motion entirely. They have almost all been able to rise out of bed at all times, and even to walk with a stick without experiencing any very acute pains. But those in whom marks of former abscesses were to be observed, who in some small part of the spine have an evident projection and convexity outwards, have all been obliged to keep their bed for several months, sometimes for whole years; and it was never till after a long-continued rest, that the spine began to recover, at the part affected, a sufficient degree of solidity to allow them to support themselves and to walk.

If rest, such as it might be, without being subjected to any rule, hath produced good effects in these cases, we may readily conceive that it would

would have been attended with much greater advantage, had it been prescribed and employed with discernment; still however this kind of disease presents us with precise indications to determine the use of it. It may even be presumed, that it would prove one of the most certain means that could be employed to prevent deformities of the spine⁽²²⁾, for it is not at the time this column discovers a tendency to projection, that we ought to leave it oppressed by the weight of the superior parts which it should naturally sustain. We should wait, till by rest and a horizontal position, the pieces that compose the column shall have lost, by the use of proper remedies, that morbid state of softness which had disposed them to be thrown out. These two means, of rest and a horizontal posture, are equally indicated whether the progress of the disorder be assisted by a weakness of the ligaments connecting the vertebræ, or by the action of the muscles. But these unions of the vertebræ, after a greater or less destruction of their bodies, which we have observed to happen in the dorsal vertebræ, may also take place in the lumbar vertebræ; and might not rest contribute to effect this salutary purpose in cases of caries with which the vertebræ of the loins are so frequently affected? Let us consult facts, that we may know how far this remedy is to be depended upon in the cure of so terrible a disease.

I have seen many of these carious vertebræ, and the death of all those who have been attacked with them, seems to proclaim that they are an incurable complaint. But before we lay down this dreadful prognostic, let us trace the disease throughout its progress, and let us consider the phenomena it presents to us during its long continuance; these may suggest some ideas from whence a more comfortable prognostic may be deduced, and which future facts may perhaps justify. We frequently see, after a fall on the buttocks which shall have occasioned a concussion in the lumbar vertebræ, after a blow received on these parts, after a violent and painful effort made to raise too heavy a load &c., after such accidents, I say, we frequently see that the persons who have suffered them, complain, some time after, of a dull pain in the region of the loins, with a difficulty of walking, which increasing gradually, without ever
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causing any very acute pain, ends, at length, in so great a weakness of the spine, that they are no longer able to support themselves, and are obliged to keep in bed. At this period, which is often nine or ten months after the accident, we generally begin to perceive a tumour which makes its appearance either underneath Poupart's ligament, or on the side of the great ischiatic foramen, and which increases slowly without being painful to the touch. When the tumour hath acquired a certain size, and that the matter which forms it is sufficiently advanced towards the skin, a manifest fluctuation is observed in it, which seems to furnish a positive indication for the opening of it^(b).

The Surgeon who makes this opening, and who sees that he has given issue to a great quantity of matter, confined for a long time in swellings of this kind, congratulates himself upon an event which he thinks cannot but turn out for the good of his patient; but the patient, who for some months past had experienced no evident degree of fever, who suffered but little, who had perhaps preserved his appetite, who slept, and who had complained of no other symptom but that he could not keep his back upright, is far from being relieved by this operation, at least if he be, the relief is not of long continuance; for the matter forming the tumour, which at the time of the opening was white as milk and without smell, soon contracts a considerable stench, a fever comes on, the pulse becomes quick and small, and the patients pretty frequently die towards the thirteenth day^(c). The body is afterwards opened, when a caries of two or three of the lumbar vertebræ, and often of part of the os sacrum, presents itself to the view; and after this discovery, the Surgeon is far from imputing to his own management the speedy death of the patient.*

It is proper, however, to observe, that this patient had lived several months, without any considerable inconvenience, with this caries, and

* Many of these and subsequent observations have been adopted by Mr. JUSTAMOND, in his *essay on abscesses*, as containing that gentleman's entire sentiments on the subject. E.

with this tumour though it contained a large collection of matter; his state would not even have been changed so suddenly, if an opening had not been too precipitately made. We shall be convinced of this by attending to what happens when these tumours are left to nature; if they burst, the opening is made much later, and it is only at this period that patients are seized with any alarming symptoms, and that too in a much less degree than after the opening has been made by art^(k). The reason of this is certainly because nature procures no more than a very small issue to the matter. If the patients then die, they perish much later than in the other instance. This difference in the event teaches us at least that we must not meddle with these tumours, that we must apply nothing to them to hasten their opening, since nature appears to disapprove of their bursting, as a termination that is not usually according to her wishes. But here some one perhaps may say, that a disease of so terrible a kind is beyond the resources of art and the efforts of nature. Let us beware of deciding this matter so lightly; and of assigning limits to nature which she hath not prescribed to herself; for since we have instances of caries of the dorsal vertebræ cured by her assistance alone, why should not her power be extended to the cure of caries of the lumbar vertebræ, if her operations were not disturbed by improper measures? At least the following is a fact which seems to prove, that this disease is not beyond her power of relief.

A young woman of twenty-two years of age, after having fallen on the bottom of her back, down a staircase, felt, for a considerable while, a pain, more or less acute, in the region of the loins, and was seized with a gradual weakness in that part, which, in a short time, prevented her from walking, and even from supporting herself; at which period, she applied to me. Revolving in my mind these symptoms and the cause that had produced them, I imagined her case to be a disease of the lumbar vertebræ, and the best means of cure that could be prescribed were rest, and lying a bed. I explained to her the imminent danger of her situation, and engaged her punctually to follow my advice. This she did very exactly, by going to bed and remaining there constantly, taking

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care to exert as little motion as possible, agreeable to what I had recommended. Notwithstanding these precautions the disease continued to advance; the weakness of the loins, and the pain she felt there upon motion, were accompanied with a tumour that began to make its appearance under Poupart's ligament, which became, in process of time, as large as ones fist, and which at length discovered an evident fluctuation. Warned by the melancholy end of all those in whom such tumours had been opened, I carefully avoided applying any thing that might hasten the bursting of it, and abstained still more religiously from opening it with a cutting instrument. This tumour, with fluctuation, after having acquired its full size, remained nearly in the same state during four months, and at that period began to be imperceptibly dissipated, so that in four months afterwards, there remained not the least vestige of it; the patient felt from one week to another, that the spine was recovering its former strength; she began to sit upright in her bed, while her back was supported; she then made a shift to walk with a stick, and was at length capable of walking alone and unsupported with as much firmness and confidence as ever; but the happy termination of this disease was owing to her persevering for near a twelvemonth in keeping her bed, and in a state of rest.

This is one of those surprizing cases that seem to be an open page presented to the practitioners of our art, in which nature invites them to meditate her walks, and teaches them to do nothing that may disturb her intentions. She shews us here a large collection of matter, to the evacuation of which, in conformity to the principles received, we should have proceeded as soon as the fluctuation had been evident, apprehending lest a longer confinement of it should produce mischief. And yet we see that this same matter, after having been collected for several months in a distinct cavity, has been received again into the course of the circulation without occasioning the least accident; and that the principal disease produced by it has been cured, without the concurrence of art, otherwise than in prescribing rest, already so loudly called for in this instance, by that same nature who has directed the cure⁽¹⁾. Instead of

silently admiring such a phænomenon, it is the province of a man, intent upon the improvement of his art, to endeavour to give such an explanation of it as shall not be disavowed by nature, whose interpreter he is to be.

Let us consider what this disease exhibits to us in the first instance. A disturbance of the organization in the bodies of the lumbar vertebræ, by means of a shock conveyed to them, or a violent divulsion of the ligaments that unite them. The swelling of the parts being the consequence of these first accidents, and a slow inflammation coming on, this at length causes a suppuration and abscess, the seat of which is in the neighbourhood of the parts affected. The organization of the bodies of the vertebræ being depraved^(m), it follows, that small separations or scales must be thrown off from these bones, which is as much effected by the organic action of the inflamed parts, as by the matter they furnish. This matter itself after having been efficaciously employed in separating the corrupted from the sound parts, is also the medium to which nature intrusts the care of expelling and carrying them out; but this purpose is effected very slowly. These bony fragments, of greater or less dimensions, being detached by means of the matter, float in that liquid, to which they present a greater extent of surface in proportion as they are more divided. The pus itself in which they are steeped, becomes a menstruum proper to dissolve them, and its quantity increasing in proportion to the continuance and extent of the suppuration that separates the loose pieces of bone, it at length makes a passage for itself towards the depending parts which afford the least resistance. It is generally underneath Poupart's ligament that these tumours manifest themselves; but the matter is still sheltered from the external air, and undergoing no change, produces no mischief in the parts that surround it. The fragments of bone which float in this quantity of pus, may at length be totally dissolved in it, so as to form a homogeneous mass, which perhaps may not then in any wise differ from our most elaborate nutritive juices⁽ⁿ⁾. This being premised, we need not be astonished, if, at this period, nature, after having employed the pus as a menstruum to dissolve

the bony fragments to the separation of which it hath contributed, should resume it into the general course of the circulation, by taking it up from its cavity, through means of the several absorbents that open on the surface of that cavity. The return of the matter being then effected as slowly as its collection was formed, the parts which compose the cavity, must return to their proper state as gradually as they were disturbed from it, without accident and without inconvenience.

With respect to the bones that are primarily affected, and which have almost adopted the nature of flesh during the long and important process of exfoliation, no sooner are they disengaged from these loose pieces, than they begin to recover their solidity; and if several vertebræ, for instance, have partaken of the injury, they form among themselves a common mass of ossification that in some measure supplies their bodies, and terminates this important cure, which, as we may observe, can only be the work of nature, time, and rest⁽⁴³⁾.

But however advantageous rest may be, however pointed may be the indication for it in the instances before mentioned, there are still other cases of caries in which this indication is more precise, and less liable to be mistaken, than in those of the dorsal and lumbar vertebræ; these are the caries affecting the joints. The ligaments, or the articulating surfaces of the bones, often suffer injuries in their organization, which cannot be removed by the usual remedies employed in the beginning, in cases of concussions, wounds, fractures, &c.; or where these injuries arise from a fault in the habit, they oftentimes will not yield to the remedies proper to resist the action of any acrid irritating principle that may have been fixed upon these parts. In these instances nature, who always tends towards a cure, hath a very great labour to perform, in the prosecution of which we must be careful not to disturb her by any indiscreet manœuvres; in order that this labour may turn to the advantage of the patient, nothing is required but time and rest. Here, as in the other cases, nature avails herself of the usual resources; she forms pus, by means of which fluid she separates from the whole, the bony, ligamentous, and cartilagi-

nous parts that are vitiated, from whatever cause; and the deposits, in the cavity of the joint, these fragments, together with the pus that has separated and conveyed them there. This pus, after having employed more or less time in melting down these fragments, might possibly, as in the instance above cited, be re-absorbed into the general mass without inconvenience. My practice has not furnished me with any instance in which nature hath followed this plan in such cases; but the following is the most ordinary way she chuses, and which she also frequently adopts in caries of the dorsal as well as of the lumbar vertebræ.

The pus, which till the time of the complete dissolution of these fragments, seemed to exert no sensible corroding power upon the texture of the skin that confines it, after coming nearer and nearer to this external covering, at length raises in it an inflammation of a very small extent, and by means of the suppuration set forward in it, a fistulous opening is made, which gives vent to a large collection of matter that hath often been from seven to eight months, and more, in forming. By this contrivance the pus being evacuated by degrees, and the air not having access to its cavity, it doth not acquire that state of decomposition which makes a destructive principle of it. The irritating faculty of the pus scarce shewing itself till all the fragments, as well bony, as ligamentous and cartilaginous, are completely melted down, it may reasonably be presumed, that the pus is as it were neutralized by the principles they impart to it, and that they are these fragments which maintain it in that mild and unctuous state we observe it to be in before this perfect dissolution. What I have said upon this point becomes so much the more probable from the circumstance of my having rarely found any bony fragments in the matter of those abscesses that have opened of themselves, and that I have always seen them in those collections which have been opened before the time intended by nature. It is plain however, that during a work so long continued, and so prudently directed, nature must have been in particular want of rest in the part where she was carrying on these operations, and that motion could only interrupt and trouble them. But if rest have been hitherto useful, it is no less necessary to conduct

conduct a cure, so happily and so wisely begun, to its end; for the bony and cartilaginous surfaces being now disengaged from all the fragments nature hath chosen to separate, presents us with lively and fleshy granulations, which are in that state of inflammation proper to contract an adhesion with contiguous granulations of the same kind. This adhesion consolidates itself by degrees, and forms at length a compleat union between two bony surfaces, destined originally to move one over the other. But in order to obtain this salutary ankylosis, nature requires rest, and rest continued with the greatest perseverance. In this great and admirable operation, she hath lost nothing but motion; and by this indispensable sacrifice, she has preserved a limb with part of its functions, and prevented the mutilation of the machine.

The description I have here given, is not a romantic idea of physiology and pathology; it is a truth founded on fact, of which I can myself give many instances. I have got a preparation by me in which the thigh bone is soldered with the os innominatum, and the polished ossified surface of which, together with the solidity of its union, leave me no room to doubt that the subject it had been taken from, had survived a long time the formation of this ankylosis. Not having known the person, nor been acquainted with the history of his case, I can only form conjectures upon this subject. But the neck of the thigh bone being extremely shortened, it is to be presumed, that its ankylosis with the os innominatum has been produced by a caries, which may have attacked the head of the bone and the cotyloide cavity in which it was lodged; and that this union has been preceded by abscesses, and other symptoms common to a caries of the joints. The following fact will contribute to support this opinion.

A poor beggar who has an ankylosis of this nature, and in whom I had frequently noticed scars at the upper part of the thigh, as well on the inside as on the outside, hath assured me, that after a fall upon the great trochanter, he had for a long time suffered extreme pains, which had been at length terminated by successive abscesses, that had kept him

in hospitals for several years, and had frequently brought him into a very dangerous state. His thigh, which forms almost a right angle with the trunk, being evidently much shorter than the other, there is no reason to doubt that this effect has been produced by the destruction of the head of the thigh bone, by a caries which nature must have succeeded in the cure of, by following the track I have just been describing.

But what I have not had an opportunity of observing myself with respect to the articulation of the thigh with the os innominatum ^(o), I have observed in articulations of the thigh with the leg, and of the leg with the foot. I have seen in these joints, abscesses attended with caries, which after having made for themselves, in a long course of time, fistulous openings, and after having furnished, for years, a discharge more or less plentiful, have at length ceased to suppurate; and have left nothing more than a complete union of the articulating surfaces that had been destroyed. But these great cures have all been owing to nature, and art has concurred in them no farther than in preventing every kind of motion, every change of posture, which might keep up the irritation of the parts affected ^(p). Dressings seldom, very seldom renewed, and an attention to place the limbs at rest between junks, as in fractures, have been the only means employed ^(q).

I might possibly have obtained the same termination in a caries, with an abscess, in the articulation of the os humeri with the scapula, had I not yielded to the temptation of giving vent to a large collection of matter that began to shew itself by an evident fluctuation. But at that time I had not been sufficiently informed by my own mistakes. The event was fatal to the patient, who died of a suppuratory fever, after having fallen into a marasmus; and though on examining the part, I found a caries of the head of the os humeri, and of the glenoid cavity of the scapula, a disease hitherto deemed incurable, I have not been the less persuaded since, that the operation I had performed, if it had not immediately caused, had at least hastened the death of him whom it had been intended

intended to relieve. Some subsequent facts have entirely confirmed me in this opinion.

A man about fifty years of age applied to me in 1770, with the bones of the wrist so carious, that in two or three places one might pass a probe through them, by following some fistulous openings that presented themselves on the outside. The wrist and the hand, which were œdematous, considerably swelled, and of a dark blue colour, seemed to require amputation so much the more urgently, as the patient was tormented with a slow suppuratory fever; it was even the advice of a man very skilful in the profession, not to defer having recourse to this last resource. Notwithstanding this, I ventured to temporize, and after having applied the usual dressings for two days, I carefully closed all the fistulous openings with dressings that were not irritating, and the hand and wrist being covered with compresses dipt in a balsamic and spiritous embrocation, made with the yolk of an egg, oil of roses, and brandy, I placed them in junks. The parts being thus kept in a perfect and constant state of rest, I made no scruple of leaving the first dressings on for ten days without a renewal, more especially as neither the pain nor the discharge required them to be removed sooner; and at this time, it was curiosity, rather than any absolute necessity, that was the motive of my doing it. As I found the discharge less in quantity, thicker, and less foetid than when the patient was dressed every day. I judged it proper to put off the removal of the second dressings for twenty days; and at this period the swelling of the hand and wrist were half reduced, and every thing seemed to bespeak, as much from the patient's countenance and pulse, as from the nature of the discharge, that hopes might already be entertained of a fortunate termination of this dreadful disease. In about two months and a half after this, these hopes were completely realized; for at this time all the fistulous orifices were perfectly cicatrized, and the cure was terminated, with no other inconvenience to the patient, except loss of motion in the wrist, which has not since prevented him from doing his usual work (r).

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But what absolute rest and unfrequent dressings have effected in combination with nature in the instances just mentioned, they have also done under my inspection, in two cases of caries of the articulation of the arm with the fore arm. One of the patients in whom this disease had come on after fracture, with splinters and abscess in the joint, had even been sent to me in order that I might amputate the limb; the surgeon who had taken care of him for several months past, judging there was no other way of putting a stop to the symptoms which attended this caries. And indeed, a very considerable and œdematous swelling of the elbow joint and neighbouring parts, a plentiful and offensive discharge, a total loss of appetite, a slow and suppuratory fever, two fistulous openings that penetrated into the cavity of the joint, and through which a probe being introduced, discovered a very extensive caries, were all symptoms sufficient to justify the operation. Yet in this case, dangerous as it was, a few months of total rest, joined to long intervals between the dressings, having assisted the salutary formation of an ankylosis intended by nature, have made all the symptoms disappear, and have effected a perfect cure of this disease, with no other loss than that of the motion of the joint.

Here are already a number of facts brought in support of what I have advanced, that whenever the inspissation of any of our fluids is required in the cure of any surgical disease, rest must be called in for this purpose; but there are other facts, and of a very different kind from those I have here alleged, which confirm the truth of this assertion. Wounds and ulcers, for instance, in the cure of which rest is prescribed with so much efficacy, do they present any other indications for the employing of this method, than such as are derived from the necessity nature is under of giving the gelatinous liquid that oozes from their surface a sufficient degree of consistence? This consistence is not only necessary that it may be enabled to supply, in some sort, the place of the skin that is destroyed, by forming the external scar that completes the cure; but also, that in the part beneath this artificial covering, it may supply the want of the cellular substance, that natural connecting medium of our

parts, which has been destroyed by the suppuration. For we are not to imagine that the gelatinous concretion which we observe in scars, is confined to what we see of it outwardly. Motion, far from assisting in this good effect, cannot but prevent it, by destroying the adhesions already begun underneath the part where the scar is to be made, by putting an impediment to the necessary concretion of the gelatinous fluids that are to form it, and even by destroying it when it has not acquired its utmost degree of solidity, as we are taught by experience, particularly in the cure of ulcers of the legs. Here the indication for rest to the part affected is so positive, that they never can be firmly healed without the help of this method, and that excess of motion alone, without the concurrence of any other circumstance, often makes them burst out again after they have been completely healed.

From hence it may be concluded, that we must be careful to prescribe rest for the part affected, during the cure of wounds and ulcers (*U*). This attention must even be continued beyond the time of the complete formation of the scar, in cases where the muscular parts underneath it are exposed to frequent motion; and it must be carried still farther when these same parts have been affected by the disease, because the gluten, supplying the place of the cellular substance which connected the muscular fibres, may not have acquired at first a sufficient degree of consistence, to resist the efforts it must then be exposed to by a strong contraction of these parts. The following fact will evidently prove how useful such a precaution is in this last circumstance.

A Journeyman Taylor, after having had an abscess by congestion, came to me in 1776 with a fistulous opening, which was already of some continuance in the upper, external, and rather posterior part of the thigh, about two inches below the great trochanter. I passed a probe into the fistula, which furnished a large quantity of serous, and somewhat fetid, discharge, and found that it passed under the external and anterior muscles of the thigh, pretty near the bone, and that it extended about six inches beyond its external opening, taking its course towards the joint.

joint. At first, I apprehended some caries of the bone, but having met with bony particles in the way of my probe, I thought it proper to treat this fistula by laying it open through its whole extent, by which I might be at liberty to act as circumstances should require, if, at the time of the operation, I should find that the disease was complicated with caries. The fistula being opened through its whole extent, and appearing confined to the fleshy parts, I should only have made a simple incision, had I not been assured from experience, that in two or three days, notwithstanding all my endeavours to the contrary, the bottom of the diseases would have been concealed from me by the distention, and even by the re-union of some of the sound divided parts. But foreseeing this inconvenience, which I had before experienced several times in similar cases, I removed some portions of the fleshy parts, and dressed the wound to the bottom and rather close. I continued this precaution during the whole of the cure, which went on as usual in other simple wounds. The fistula began to fill up, and to consolidate itself gradually, the edges of the divided parts sunk by degrees, and in two months, formed almost a complete cicatrix, which seemed to promise a certain and speedy cure. But at the time when the scar was just closing, the patient, who had constantly kept his bed, having risen and walked more than he ought to have done, felt, a few days after, some pain; a redness appeared through the whole length of the scar, with a small projecting blueish point in the middle, which having burst with my nail, a small opening presented itself, from whence there issued a kind of bloody and ferous discharge. I thought at first that this opening was not deep, but having probed it, I had the chagrin to find, that all I had done was in vain, and that there was now a fistula almost as extensive as when I first undertook the case.

This discovery soon made me suppose, that the action of the muscles, at a time when the scar was yet recent, might possibly have destroyed the adhesions formed between the parts that answered to the channel of the old fistula. I proposed therefore to confine this action, and even to annihilate it in those parts, till they should have acquired a solid coherence

between themselves. To effect this, I placed on the channel of the fistula a thick roll of wetted lint, and applied over it, thick, graduated compresses, exactly maintained, and strongly bound on the part by means of a bandage carefully rolled on. This precaution, continued for some time, made me hope that I might cure this complaint without having recourse to a fresh operation; but the patient rising out of bed, instead of using a bed pan, and the motion he gave to the part loosening the bandage, I obtained only a partial success from it.

The fistula indeed closed itself, but this was frequently only for a few days, and though it was not so deep as before, yet still the little sinus that remained, made me always apprehend a return of the complaint. To get rid of this anxiety, I determined to pass, for two days, into the sinus, a piece of lint impregnated with some digestive ointment animated with precipitate. At the end of two days I omitted this tent, and renewed my bolstering and compression on the whole extent of the sinus as before, with the additional precaution of placing the limb in junks and other supporters, as I should have done for a fracture of the upper part of the thigh bone, or of its neck. By all these attentions, I at length succeeded in obtaining a perfect cicatrix; but that I might not be exposed to a relapse, I continued them perhaps beyond the time necessary to effect my purpose, chusing rather to use too much precaution in this case than to neglect any.

By judging from this fact, it should seem that nothing is required in the cure of sinusses, except the contact of the parts which form the channel, and a perfect state of rest for as long a time as is necessary, that they should contract solid adhesions between themselves. Are there not a variety of cures, effected in these complaints by exact and well-maintained compressions, which confirm this truth? Even the precautions by which I succeeded in the cure of the case above mentioned, do they not almost argue the inutility of the great operation I had at first attempted (^u)? At least they tell us very plainly, that we must not re-

fort to such an operation, till compression, employed with all the sagacity which different cases may require, has been found insufficient (^u).

Even fistulas of the anus present some precise indications for the employment of rest. The division of the nooze or bridge of flesh that lies between the two openings forming the fistula, does nothing more than protect the parts forming the nooze, from that habitual motion which prevented their re-union. When they are once divided, they enjoy, in comparison with their former state, a degree of rest sufficient to allow the cicatrix to be formed throughout the whole ulcerated extent that formed the sides of the fistula. We may even observe, that the healing of the wound is never more surely and more speedily effected, than when by means of a soft tent, we make our dressings press a little upon all the diseased part; for they are not the ointments with which these tents are covered that perform the cure, since I have often effected this without their assistance. Neither is it the passing of the excrements that puts an obstacle to the cure; since I have seen perfectly cicatrized in a short time, fistulas, in which the wound was constantly covered with fœces. But the use of the tent is so far from being an indifferent matter, that I have often observed the fistular canal to become ulcerated again, when this compression was left off too soon after the formation of the cicatrix.

From these observations, the propriety of which must be evident, it follows, that it might perhaps be possible to cure fistulas of the anus without either incision or ligature. A careful compression, made by means of a pretty firm tent, introduced much beyond the internal orifice of the fistula, might be the more likely to succeed in the cure of this disease, if by previous evacuations and a strict diet, the first discharge of excrement could be delayed till the sides of the fistula should have acquired an adhesion sufficiently strong and firm, not to be destroyed by the contraction of the sphincter. These are trials to be made, if they have not yet been attempted, and the effect of them I shall soon have an opportunity to determine.

But

But if rest of the parts concerned, be indicated in the cure of fistulas, of which there is no doubt, it seems not less so in the prevention of them. Abscesses which happen in the circumference of the chest, and which so frequently remain fistulous, whether they burst of themselves, or whether they be opened by small incisions, become so merely from the continual motion annexed to the parts in the extent of which they are formed. But there are means of restraining this motion, and of keeping these parts in a state of rest necessary to bring about their cohesion. A free incision, carried even across the muscles that cover these abscesses, openings extended according to the direction of the sinusses they present, compressions disposed with skill, &c., are the means by which we obtain this desirable effect, which is almost a certain warrant of a radical cure. It is indeed constant, that compressive dressings, so efficacious in the cure of most wounds and ulcers, are in these cases of still more remarkable advantage than in any other; and that the state of rest in which they maintain parts naturally moving on each other, by enabling nature to work with effect in uniting them, prevents fistulous ulcers, which would often have been the consequence of not attending to restrain the natural motion of the parts.

From what has already been said, it appears how numerous the indications are for the prescribing of rest in surgical disorders; though we have only mentioned those in which nature requires an inspissation of some of our juices. But the indications which call for the use of this principle are not limited here; they are applicable to so many surgical diseases, that we may consider it as the most extensive curative medium the art can employ. The cases we have already gone through will impress an idea of the truth of this assertion, and those which remain still to be explained, will give it the highest degree of evidence. But we shall go through them in a summary manner, because the indications which most of these cases present for the application of this method, are too positive to be mistaken; and the employment of it then becomes a precept of the art.

Is it not, in fact, an established rule, that we must have recourse to rest in all surgical disorders, where motion may impede any salutary cohesions, or may occasion pains, irritations, or frictions that may bring on disagreeable consequences, or may displace parts that should be kept in the situation they are, or may produce dangerous effusions of blood, &c. ? Therefore, in cases of recent wounds we wish to re-unite, in dislocations newly reduced, in ruptures attended with bad symptoms, and which have been just returned by the taxis, in losses of blood which come on during gestation, in cases of wrenches and forcible extensions of the ligaments, in ruptures of these parts, as of some muscles and tendons, in contusions of the joints ; in all these cases, it being evident that motion indiscreetly employed is liable to bring on great mischiefs, these mischiefs themselves are so many absolute indications which direct the prescribing of rest. Besides, experience has so fully proved the necessity and advantages of this method in all such cases, that it would be needless to insist any longer upon it.

We shall only observe, that in cases of shocks in the joints, and of dislocation, and contusion in the ligaments that surround and strengthen them, as motion necessarily produces pains which cannot but increase the irritation, tension, and inflammation which usually attend these accidents from the first, rest presents itself as the most efficacious method of cure that nature can furnish under such circumstances. We ought then to rely upon it the more, as it cannot be supplied by any thing else ; for all that art should attempt, is only to mitigate the pains, to assuage the irritation and tension of the parts, and to prevent inflammation and the fatal suppurations it may occasion. Now, amidst all the methods that art can suggest to counteract these effects, rest is the most powerful ; bleeding, diet, and external applications being only accessory helps, the efficacy of which is so much the more evident as they are combined with this principal agent ^(w). But supposing that these means should have been neglected in the first instance, or that notwithstanding the application of them, abscesses should be formed in the cavities of the joints, and that the surface of the bones designed for their motion should be affected with

with caries; rest, at this period, and in the subsequent treatment of the disease, as we have before proved, is one of the chief methods of cure corresponding to the views of nature.

We cannot likewise but be sensible of the efficacy of rest in inflammatory tumours of the testicles, and in a falling down of the womb. Is it not also evident in cases of commotion, either of the spinal marrow, or of any of the important viscera that are contained in the abdomen, the thorax, and the cranium? The accidents which follow these commotions, being always the effect of a violent degree of motion communicated to these parts, do they not present us with positive indications for the prescription of rest ^(*)? I have seen a young lady of nineteen, who, after having by chance jumped some few steps off a staircase, remained senseless for several hours. She afterwards fell into swoonings every time she wanted to sit upright in her bed; and it was only by rest and a horizontal posture, persevered in for several months, that she was completely cured of this accident.

From what has been already said, therefore, we may be convinced that rest, as well as motion, is indicated on so many occasions, that we might strictly affirm these two means of cure to be universal and exclusive; and, what is more, there are infinite numbers of reasons that present themselves in support of this conclusion. The disorders which the animal œconomy may experience, are, in fact, nothing more than the produce of an excess or deficiency of motion ^(v); and nature and art cannot really succeed in repairing these disorders, but by increasing the power of motion when it is too weak, and diminishing it when it is too strong. Nature, indeed, in all her efforts to cure, clearly shews us these two points of view, to which all that medicine and surgery can prescribe, in the disorders belonging to their respective province, is obliged to conform itself. But amidst the several curative means, to be able to chuse those which can produce either of these effects, in the exact proportion required for the recovery of health, would be the utmost perfection of our art; to which human skill, however, can never expect
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to attain. In endeavouring, therefore, to shew, in this essay, the advantages that may be derived from motion and rest in the cure of surgical affections, I have, indeed, only given a sketch of the subject. May the other competitors give complete satisfaction to the members of the academy upon this point, and present them with performances worthy of themselves!

K

NOTES

N O T E S

BY THE AUTHOR.

(a) **T**O the observations contained in MONSIEUR QUESNAY's *Memoir upon Wounds of the Brain*, (printed in the first volume of the Memoirs of the Academy of Surgery,) where this fact is established, may be added, the observation of a rod of iron having passed through the brain, without causing the death of the patient—*Journal de Medecine*, August 1777.

(b) The ganglions of the cervical and intercostal nerves, and of those which are placed in the cavity of the abdomen, are they not, as Mr. LE CAT has asserted, with so much probability, in his dissertation on the nervous fluid, which obtained the premium at Berlin, in 1757; are they not particular organs, in which the fluid undergoes elaborations, and receives qualities relative to the functions of each of the viscera, to which the nervous filaments proceeding from these ganglions are distributed?

(c) I mean the fluid which forms the connection between the material and spiritual parts of our being.

(d) This medium comprehends a certain latitude, within the limits of which, health is included.

(e) By these bounds we are to understand the *quantity* of life, not the *duration* of it. A valetudinarian lives, but he enjoys a less degree of life than the man who is in full health.

(f) The following fact will prove, that however inconsiderate such a practice may be, there are still many persons who follow it.—A country surgeon, being called some years ago to reduce a fracture of the olecranon, did nothing more than place the fore-arm in a state of extension, and maintain it there by a bandage and some splints. Twenty days after the accident, the parents of the patient called in the assistance of two surgeons from a neighbouring episcopal city. They exclaimed openly against the practice that had been pursued, and decided, that as an ankylosis was the unavoidable consequence of such a fracture, the bent posture of the fore-arm should be preferred to its extension. Accordingly they exerted all their efforts to separate the union already begun, and placed the fore-arm in a sling. This fact was told me, a few months after, by one of the surgeons concerned, who related it as a proof of his own judgment, and of the unskilfulness of the first surgeon employed, who probably had not been directed in his practice by reflections drawn from the nature of the disease; otherwise he would not have suffered practices so repugnant to the good principles he would have adopted: for to place the fore-arm in a bent posture in a fracture of the olecranon, is the same thing as bending the leg upon the thigh in a fracture of the patella.

(g) I say a moderate extension, because a too strong one, especially if the olecranon were fractured near its origin, would push the cubitus too much forward, and prevent the fractured surfaces from being adapted to each other. This would occasion, after the union was completed, a
bony

bony projection on the side of the joint, which might totally impede its motion. If the fracture should have happened nearer to the extremity of the olecranon, the forcible extension of the fore arm would make a gap between the fractured pieces on the side of the cavity of the joint; the olecranon would consequently become somewhat lengthened, and thrown up, and the effect of this injudicious practice would at least be a difficulty and a decrease of motion.

(*b*) Upon this subject may be seen the second part of my Essay on Counter-strokes in other Parts of the Body besides the Head, which obtained the prize in 1771, under the the name of John Martin Bazille. *Prix de l'Académie*, VOL. IV.

(*i*) I have seen some persons attacked with this disease, in whom the symptoms, before the opening of these abscesses, had not been more intense than those here mentioned; and who, after the evacuation of the matter, have perished at the period I have marked.

(*k*) I have at present under my notice a very striking instance of what is here advanced. A young man of four-and-twenty years of age, who has an abscess in the loins after a disease of the spine, so evident, that it forms a pretty considerable projection, had experienced, during the formation of this abscess, no other symptoms than a debility of the spine, attended with a dull kind of pain, without any remarkable fever or loss of appetite, &c. But this abscess having at length burst itself, the patient was seized a few days after with a strong fever, and a total loss of appetite and rest, which gave reason to apprehend that the disorder would soon terminate fatally. But after he had continued a fortnight in this alarming state, he began to grow better; the discharge, from being ichorous and offensive as it was, loses daily its bad smell, and acquires a better consistence; the pulse becomes more regular, and every thing seems to promise, that with time and rest, the patient will escape with no other inconvenience than that of being a little deformed.

Such

Such was the state of this patient, when this essay was sent to the Academy; and it had been so much mended since that time, that the cure appeared certain. The patient had recovered his appetite, digested well, the matter which issued from the fistulous opening was thick, and less in quantity, the spine gathered strength daily, and the patient began to walk with a stick. But the spine being more crooked than I at first imagined, I thought that by bringing it gradually to a state of extension, while the intermediate substance which was to supply the place of the bodies of the vertebræ was still capable of yielding, the deformity might at least be partly corrected, or its farther progress prevented. With this view I ordered him to lie on his back, and placed a small bolster under the part of the spine that projected. The desire the patient had of being cured without deformity, induced him to bear the pain this brought on, without complaining. He no longer slept at night, and though I made him change his posture, and removed the bolster as soon as he had told me of the pain he suffered from it; yet I had the mortification of seeing, that the symptoms which had disappeared, immediately after this trial, returned. The discharge became more and more plentiful; a slow fever appeared and continued; a tumour even, but very deep seated, manifested itself on the loins opposite to the fistulous opening; and there came on at intervals, a loss of appetite, a diarrhœa, and after six months gradual decay, the patient died. Though I found, on opening him, the bodies of the two last dorsal vertebræ entirely destroyed, and an incompleat union between the bodies of those vertebræ that were in contact, I am not the less persuaded that the patient would have been cured, had it not been for that unseasonable extension of the spine, which brought on the return of the pain, and of the other symptoms. When nature, for the preservation of an individual, makes a sacrifice of the motion, or of the figure of any part, it is often necessary that art should not strive against her in attempting to restore what she gives up, but should only be the spectatress of what is going forward. This fact, and some others which will be recorded in a collection of observations I am preparing to give to the public, will furnish sufficient proof of this assertion; and in this respect I shall not
hesitate

hesitate to confess my mistakes. The history of these, oftentimes proves more instructive to others, than that of our successes.

(*l*) The impossibility of walking, and the necessity of keeping in bed, which attend this disease, are a proof of this.

(*m*) It is always the depraved organization of the bones that causes the caries and the desquamations; but this depravity may be produced, not only by the action of some power on the bones themselves, but also by injuries affecting either the cartilages that line, or unite them; or the ligaments which form and strengthen their union; or, lastly, the periosteum which covers them: for the affections of these parts which are essential to the bones, are often transmitted to them, and occasion the caries.

(*n*) I might alledge in support of this, the white colour, due consistence, and total inoffensiveness of smell, in the matter discharged from these abscesses at the time of their being opened. See the first part of my Essay on Counter-strokes, &c. already referred to in note (*b*).

(*o*) In saying this I have suppressed a fact which might have discovered me to be the author of this essay. For in the essay before referred to, may be found an instance of an ankylosis of the thigh with the os innominatum, after a caries. See page 590 of the fourth volume of the prizes of the Academy of Surgery ⁽²⁵⁾. I shall even observe here, that that patient experienced the last symptoms which brought him to the hospital, merely on account of a fresh fall on the part.

(*p*) I have at present under my care, a young man who has the joint of the ankle completely ankylosed, in consequence of a caries of the astragalus, the os calcis, and the articulating extremity of the tibia. This case promises a speedy cure, as there are now but a few fistulous orifices open, through which some few small exfoliations, still to be made, will pass.

(*q*) The

(9) The following are facts, supplied me by the practice of the hospital, since I sent this essay to the academy, and come very conclusively in support of the curative means, the efficacy of which I have established. Peter le Leu having fallen, on the 22d of December 1777, on his right knee, felt a sharp pain, but still took so little notice, that he continued his work the next day. Two days after, the pain increased so as to make it impossible for him to work; a considerable swelling, attended with much fever, came on, and an abscess was at last formed in the joint. A fluctuation, at a projecting point on the inside of the knee, became evident five weeks after the accident; and the pus collecting more and more, at length formed an external and very apparent tumour. The surgeon proposed opening it, but the patient not submitting, he was left to the care of nature alone. Towards the end of March, the matter made two openings for itself, from which there issued at first a matter without smell, and in very great quantity. But the pus soon changed its nature, becoming in a few days bloody and foetid, and the patient then found himself in a much worse state than before the vent of the matter, which had been encouraged by all kinds of maturing applications. Nevertheless, the patient, left totally to himself about this time, confining himself constantly to his bed, and avoiding all motion of the part to save himself from the pain that attended it, the discharge began to lose its foetid smell and to become less plentiful. The articulating surfaces of the thigh bone and the tibia were afterwards gradually folded together, so that when the patient came into the hospital on the 15th September, 1778, he had nothing more than a small fistulous opening at the upper and internal part of the leg, from which only a small quantity of pus was discharged, the good condition of which bespoke the speedy termination of this disease. It has ended in a complete ankylosis, with a projection of the tibia backwards, such as would be observed in a luxation of the bone towards that part, and which is probably as much owing to the destruction of the crucial ligaments at the time of the suppuration of the joint, as to the position the patient may have kept the part in during his long continuance in bed,

The following fact furnishes another instance in which nature seems to be preparing the same kind of termination. A soldier named Pecquigni, in the regiment of Touraine, having marched some days after he had received a wrench, has suffered all the accidents that can possibly follow so imprudent a step. A pain and inflammatory swelling came on, the suppuration of which being long delayed, it was resolved to remove him to another place. The tumour having at length suppurated and opened itself by five or six fistulous orifices, which, on being probed, evidently discovered a very extensive caries of the bones of the tarsus, and of the joint of the leg with the foot. The patient was sent back to the hospital at Rouen, where he came on the 14th of August. He had a slow suppuratory fever, which grew higher every night, and was attended with cough and a hoarseness. The foot and lower part of the leg were extremely swelled, and at the circumference of the tarsus and the joint, there were several fistulous openings which furnished a great quantity of ichorous, bloody, and very foetid pus. The state of stupidity in which I found the patient the next day and the day after, a colliquative fever, with a diarrhœa, an ash-coloured and emaciated countenance, made me consider amputation as a very uncertain method of preserving his life. This, joined to the aversion I have for these mutilations which are so often ineffectual, led me to entertain hopes, even in this case, critical as it was, of the effects of rest and infrequent dressings, which I had so effectually employed for three months in a caries of the wrist, which I shall mention hereafter. Accordingly I covered the fistulous openings with pledgits dipt in the commanders balsam ⁽²⁶⁾, and put over them large plaisters of diachylon, resolving to dress my patient only every five or six days, and putting the part between junks. Since five weeks that I have persisted in this method, the diarrhœa has stopped, the countenance and the pulse are infinitely mended, the discharge is thicker, less in quantity, and less foetid; the patient sleeps, and has recovered some appetite, so that we may already indulge in the hope of seeing this malady terminate by a salutary ankylosis.

(*r*) To this fact I can add another of the same nature, in which the mischiefs, though carried to a much higher degree than in the fore-mentioned observation, are evidently yielding to the method I have been describing.—Michael Davoux came into the hospital in May, 1778, with a compleat caries of the whole carpus, accompanied with three fistulous openings, communicating with each other on the inside and outside of the joint; the parts in the neighbourhood of the caries were œdematous, and swelled to so considerable a bulk, that most of the fingers measured more than five inches in circumference. If we add to these circumstances a slow colliquative fever, with a foetid and plentiful discharge, we shall have an idea of the disease. The amputation of the fore-arm seemed indeed the only resource of the art in this case; but before I determined on this operation, I was desirous at least of giving a trial to the methods that had succeeded so well to me in similar cases. Pledgits dipt in the commanders balsam, placed upon the fistulous openings, and confined by diachylon plaisters and compresses dipt in a balsamic embrocation, have been the only remedies used for this patient, since the time of his coming into the hospital, to the end of September. These have been assisted by intervals of ten, fifteen, and twenty days between each renewal of the dressings, and by maintaining the part in the most constant state of rest, by means of false junks. These means have brought this terrible disease into a state that enables us to prognosticate its cure; for at the time I am writing, all the fistulous orifices on the back part of the hand are closed; and of these, which answered to those on the inside, there now remains but one, which furnishes nothing but matter of a good consistence, and in small quantity. These circumstances, added to a very considerable diminution in the bulk of the parts affected, seem in fact to be the forerunners of an approaching cure.

(*f*) It is sufficiently known, that a whole limb may be put in motion, while the circumference of a wound or ulcer, upon some part of that limb, may be in a perfect state of rest. It is not therefore this sort of motion, that we mean to forbid here; it is that kind that should be exerted so as to bear upon the injured part itself, and so as to destroy in it, the
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arrangement and adhesion of the nutritive particles nature has brought there for the formation of the scar.

(*t*) It is however to be presumed, that when fistulous openings extend underneath aponeuroses so strong and so tense, as the fascia lata, compressions can scarce ever be made, so powerful and so exact as to effect the proposed union throughout the whole extent of the sinus.

(*u*) If the fistulous opening be produced by a deep-seated caries, it will be readily conceived, that any compression which should re-unite the sinus, before the caries were cured, would prove both useless and pernicious.

(*w*) In the memoir referred to above, and which I had not quoted, lest I should have been discovered, it may be seen, how much I insist upon rest, as a mean of cure in most disorders that are the effect of counter-strokes in the joints, extension of the ligamentous parts, &c.

(*x*) The same memoir above quoted, in representing these different accidents as the natural consequence of counter-strokes in these parts, proves also, that rest is the method of cure chiefly pointed out in these cases. We may even conceive that the prescription of that, as well as of motion, is as much the province of the physician as of the surgeon; and that it would be rendering a very important service to the art of healing, to explain the indications which should lead us, either to prescribe or forbid the use of these two means, in diseases which are more properly belonging to medicine; for it must be acknowledged, they are too indiscriminately ordered in the cure of internal complaints. I have several facts by me which prove, that exercise, and pretty strong exertions of motion, have been very indiscreetly recommended in cases which, had they been properly distinguished, ought to have directed the exclusion of this kind of remedy, the effect of which could not but be, as it proved, very prejudicial; and I have other instances, in which rest has been prescribed from fallacious indications, which, if better understood, should have de-

terminated the employment of motion. But the conditions of this thesis, not allowing me to make any excursions foreign to my subject, I have only judged it right to mention this, as one of the most interesting questions that can be discussed.

(y) Every thing in nature is motion ; it is the universal restorer and destroyer. Absolute rest, especially in animated beings, is an imaginary thing ; for rest can only be relative, since it implies only a degree of motion reduced below a certain term of comparison.

NOTES

N O T E S

BY THE TRANSLATOR.

(1) **T**HE author has prefixed an advertisement to this essay, in which he mentions his reasons for publishing it himself. Though this detail is here omitted, as being in no wise essential to the point in question, or interesting to an English reader, yet I have judged it most proper to keep the performance in the form it was designed by the writer to appear.

(2) This supposes the nervous fluid, (if even there be such a thing existing) to be *fire*. I mean not to dispute this point with my friend. I would only observe, that this, as well as the rest of the introduction to this essay, is entirely conjectural. However ingenious it may appear to be, it cannot serve as the basis of those great truths, with which this valuable, though small performance, abounds, and which are founded on experience alone. This introduction therefore, might perhaps have been left out without any detriment to the subject. But as I hope it will be found entertaining, and full of new ideas, I should not have done justice

to

to my friend's public appearance in this country, had I altered his dress, or pared off any of its embroidery.

(3) The general opinion of anatomists is, that the Pons Varolii is formed, by the union of the peduncles of the brain, with those of the cerebellum. These peduncles seem evidently to be productions of the medullary substance of each of these parts.

(4) If the grayish or cineritious colour of the brain, be the distinguishing character of a secretory organ, it should seem, that the whole cortical substance of the brain should be the glandular part of it, or that part in which the fluid destined to be conveyed by the medullary substance is secreted. This, indeed, is generally supposed to be the case. Nature however seems to have placed the medullary substance more out of the reach of external injury, than the cineritious substance; for the former is deeper seated, and the latter, (from whence it is also called cortical,) is every where placed on the outside of the medullary substance, surrounding it on all sides, and seeming to protect it. Accordingly, in wounds of the brain, it is the cineritious substance which is first affected, and more of that is always necessarily destroyed than of the medullary substance. This last indeed has been considered, by all writers, as the most important part of the brain, and that chiefly from its more internal position. On the contrary, it may be urged in favour of our author's hypothesis, that the cortical substance of the brain, being only designed to secrete those fluids that are to put our loco-motive powers in action, it was not necessary that it should be so particular an object of nature's care. It should seem indeed, in general, that nature is more anxious to place the organ which conveys the secreted fluid, out of the way of danger, than that in which the secretion is performed. For the secretion may still be carried on in one part of that organ, though another part of it should be diseased, or even destroyed. The instances of this are so common, that it is unnecessary to mention them. But if the channel which conveys the fluid be cut off, and the fluid so secreted should be necessary to life, the communication between the secretory organ

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gan and the vital principle, would be intercepted. If, for instance, one part of the intestinal canal, or some of the lacteal vessels, should be incapable of secreting and absorbing the chyle, this process may be carried on by the rest; but if the thoracic duct be injured, the animal must unavoidably perish, because no more nourishment can be conveyed into the machine*. Accordingly, the thoracic duct is placed with so much care, that it is almost impossible it should ever suffer from external injury. But this is all, as was before observed, the field of conjecture, in which, any man who wanders, must unavoidably lose himself.

(5) These tubercles seem to be entirely composed of the medullary substance of the brain. This does not appear to agree with our author's system.

(6) The lymphatic vessels, are not continuations of the arteries. They are a distinct set of vessels, whose origin is throughout the whole surface of the body, and from the surface of every cavity in it; and the termination of which is in the thoracic duct. They constitute the system of absorbents throughout the animal œconomy; and, as it appears from the late discoveries made concerning them, by anatomists who have been, and some of whom are happily still the light of the present age, their functions are as important, and as surprizing, as those of any other vessels in the body.

(7) We have a decisive proof of the possibility of nutrition without the aid of the thoracic duct, in the case related in Vol. LXX of the Philosophical Transactions, by Dr. CHESTON of GLOCESTER. In this instance the duct was rendered impervious by the accumulation of ossific matter within its cavity, so as to render the passage of any fluid from thence to the subclavian vein, a matter of absolute impossibility.

(8) As these two kinds of motion, described by our author, are very distinct, so do the effects they each of them produce; seem to be.

* In opposition to this opinion, see the case of an ossified and impervious thoracic duct, related in Vol. LXX of the Philosophical Transactions, by Dr. CHESTON. E.

The excess of intestine motion produces all those general diseases in the habit, which are the effect of any universally irritating cause whatsoever; such as inflammatory fevers, epileptic fits, universal spasm of all kinds, apoplexies, violent and sudden hæmorrhages, with many other disorders that fall chiefly under the province of the physician, and were therefore out of our author's discussion. A deficiency of intestine motion, on the contrary, produces all those complaints that are the effect of a general relaxation and debility, throughout the animal œconomy. Under this class may be ranged all putrid fevers, dropies, &c. There is another surgical disease which may likewise be referred to either or both of the above causes combined; I mean true or mixed aneurisms of the larger arteries, that are not the immediate effect of external injury. Although these complaints manifest themselves in some particular part, as in the thigh, leg, or arm, and therefore put on the appearance of local diseases, yet the fatal event that almost constantly follows any operation performed in these cases, seems to indicate a general disease of the whole arterial system. This may proceed either from the intestine motion of the heart and arteries being too strong for the resistance of the arterial coats, or from a want of intestine motion in the arterial coats themselves, which, preventing them from reacting properly on the fluid thrown into them by the force of the heart, occasions them to give way, and to swell out into aneurismal tumours; or, which is most probable, both those causes combined may produce this disease. However this may be, it is no less apparent, that this is some peculiar disease of the whole habit; for among the several instances of this kind that I have seen, I never saw one recover after amputation, which is generally the only operation that can be performed in these cases*. In one of them that was under my care at the Westminster Hospital, I had flattered myself with some hopes of success. It was a very large aneurism of the femoral artery, for which I was obliged to amputate the thigh, very near the groin, because the disease ran far up the limb. The wound, from the beginning of the suppuration,

* A case of popliteal aneurism, which was treated by amputation in the Gloucester Infirmary, proved successful. E.

appeared florid and well ; the patient was in good health and spirits, and for more than three weeks, every appearance was as favourable as I could wish. This was a longer time than I had usually known patients to live after amputation in these cases ; most of those I had seen, having expired within a fortnight. The stump was now nearly healed over, when, all on a sudden, a total languor came on, and a sphacelus of the stump, which carried off my patient in four-and-twenty hours after its first appearance. Must these deplorable cases then be left to themselves ? or are the very rare instances of success, which some persons say they have seen in them, sufficient to justify us in running the immense risque we do in meddling with them ? It must be owned, indeed, that these patients, if not relieved, will at length of themselves become victims to the disease ; but, as we know not how long they might live under it with care and quiet, why should we venture to risque hastening the death of twenty persons, let us suppose, for the bare possibility of saving one ? A dreadful alternative indeed ! but let us hope that some method may hereafter be found out, to render the assistance of art less precarious in these cases. It may not be improper to add, as a farther proof of this disease being a general one of the whole habit, that in recent, and, as they usually are, spurious aneurisms of the arteries in the extremities, from bleeding or other external injury, the operation of tying up the artery as practised in these cases, is itself sometimes successful ; and even when that fails, the subsequent amputation of the limb, which then becomes necessary, most commonly saves the life of the patient ; but these are only local disorders, in which the rest of the arterial system is not in the least concerned*.

* The improvements suggested by Mr. Hunter in the treatment of aneurisms, were subsequent to the annotator's observations on the subject, as here set down. They afford proper matter for the reader's consideration, since the trials hitherto made, have, happily, tended to contradict the opinion, that the disease is a general one of the habit, and therefore not curable by any operation. Some valuable communications on this subject are to be found in the London Medical Journal ; in the 7th volume of which, is a description of Mr. Hunter's operation, and an account of its success. E.

Such is the nature of the disorders proceeding from the excess or deficiency of intestine motion, or of that which is independent of the will, and essential to life. On the other hand, the excess of the loco-motive faculty, produces a great number of local diseases, such as external inflammation, abscesses, &c., and is one general cause of fractures, luxations, and sprains in the extremities; while the deficiency of it, occasions rigidities of all kinds in the limbs and joints, local obstructions, rheumatism, gout, &c. Thus we see, that disorders produced by the excess or deficiency of intestine motion, are general as their cause: those brought on by the same errors in the loco-motive faculty, are partial as their principle. I have considered fractures and luxations as being produced by excess of the loco-motive power, for it has always appeared to me, that most bones were broken by the strained action of the muscles upon them, rather than by the application of external force. In cases where the limb is quite passive at the time of receiving the accident, as where a coach or cart wheel passes over it, it is indeed evidently otherwise. But when the accident happens by some slip or sudden effort, the muscles, inserted in the bone, are then excited to their greatest power of action, in order that we may be kept, if possible, from falling. It is at this instant, I suppose, that the bone breaks. In fractures of the patella, this manifestly appears to be the case. This bone is so thick, and its texture so firm and compact, that any outward force applied that should be sufficient to break it, would infallibly shatter the joint, and, perhaps the whole limb, to pieces: for external force cannot be confined immediately to the spot on which it is exerted, but necessarily extends itself in proportion to the weight, velocity, and other advantages it may act with. We may conceive then, that fractures of the patella, always happen while the knee is bent, which it generally is, when the foot slips in any manner. The strong extensor muscles inserted into the patella, then exert all their power to bring the leg to the straight line, which would prevent the body from falling; but as they cannot overcome the sudden effort which determines the fall, all their force must necessarily be spent on the patella, which being then pressed across a fulcrum, formed in the state of genu-flexion, by the condyles of the thigh bone being pushed forward,

forward, must the more readily give way; and thus the knee pan is broken before the patient falls to the ground. That the cylindrical bones of the extremities may also be broken in this manner, is probable, from the great difference of fractures happening while the limb is in a passive, or in an active state. In the former case, there is generally a much greater comminution of the bones, the neighbouring parts are more injured, and the fractures for the most part are compound. In the latter case, or when the limb is broken by some sudden slip or effort, the mischief is frequently nothing more than a simple fracture of the bone. Both these causes, it is true, (to wit, a too strong exertion of muscular action, and a violent concussion from external force,) may concur in producing fractures, dislocations, and sprains. These must necessarily be of the worst kind; and accordingly we see, that in fractures from sudden leaps, in which the force of the muscles of the foot is exerted in its highest degree, and in which the part must also receive a very powerful external stroke, proportioned to the height and velocity of the fall, and to the nature of the bodies on which the foot may light; in these cases, I say, we generally find the ankle joint torn to pieces, and that a mortification, the consequence of this complicated injury, destroys the patient in a very short time, unless this fatal event be prevented by immediate amputation*.

These

* The following very remarkable accident happened to a traveller on the box of a stage coach. He was thrown on the ground with great violence, by the overturning of the carriage, and was soon afterwards taken to a neighbouring house, with his ankle in a very deformed state. Two gentlemen of the faculty, who were immediately called, finding a great degree of mischief done to that joint, and that, from a preternatural fullness of the posterior parts, some of the tarsal bones were displaced, took no small pains to restore to its proper situation, what was evidently much out of it. Their endeavours, however, were fruitless; so that after a considerable time spent in the attempt, (as well as at the desire of the patient himself,) they were obliged to desist. The joint was then poulticed, with a view to reduce the tension, which, by this time, was become very considerable. Three days afterwards, it appeared, that an extraneous body had been forced in, between the inferior part of the tibia, and the tendo Achillis. The violent pressure, which had been made use of to return this substance to its place, produced a mortification of the integuments, and these sloughing off in the course of a few days, afforded an opportunity of extracting, what was before suspected to be, a

These researches into the mode by which different accidents can be produced, may be thought more curious than useful; but it must be considered, that, in many surgical disorders, great stress is deservedly laid on the manner in which an injury happens, on the nature of the instrument it was made with, and even on the situation of the patient when he received it. In the present instance, these different accidents may suggest very different indications of cure. But this point cannot be discussed here, for I would not anticipate my friend in bringing forward observations, which are peculiar to him, and which will shortly come from himself*.

(9) A fat person might therefore subsist longer, with a less proportion of nourishment, than a lean one; for while there is any fat remaining in the cells of the cellular substance, it will necessarily be absorbed, for the nutrition of the animal.

(10) Vide Dr. CAVERHILL's treatise on the *gout*, relative to the cure of that disease by motion.

(11) The gentleman who is the subject of this remark, is my intimate friend. Just after this performance was printed, he had a pretty smart attack of the disease, in his foot. He attributed the return of this complaint, to his having again neglected his usual amusement of tennis, for two years past. When he was seized with this fit, which, from its first violence, seemed as if it would last some time, I advised him to rise constantly from his seat, notwithstanding it put him to great pain, and by degrees, to move his foot as much as possible. I also directed soft and dry friction, to be used frequently in the day. By these means, and by

portion of the astragalus, separated by the fracture of that bone. The patient, by proper care, afterwards recovered. An instance similar to this happened to a poor man's leg, owing to the falling in of a stone Quarry; by which accident it had been most terribly shattered, and a large fragment of the astragalus forced into the same situation with the above. E.

* This alludes to the Memoir on Counter-strokes, annexed to the present publication. E.

keeping him in a constant copious perspiration, the fit lasted no longer than three or four days. After it went off, he had a large boil formed on the upper and back part of the thigh, which suppurated very plentifully, and confined him for about a week longer.

(12) In support of this opinion, it may be added, that all persons subject to the rheumatism, are always more affected with the pain, in the morning, at their first rising, after they have remained for seven or eight hours in a complete state of rest. The pain is scarcely supportable at their first getting out of bed, but, with the exercise of the day, and gently using the part to motion, it always grows more tolerable. From this it should appear, that the advantage of warmth, however great it may be in this disease, cannot be comparable to that of motion; since the superior warmth of the bed and of a state of sleep, cannot compensate for the want of motion.

(13) Perhaps it is one of the greatest desiderata in surgery, to be able, either to assist nature in the formation of an ankylosis, or to form one artificially when nature does not seem to be disposed to it. Let me be permitted to observe here, that all the means which the ingenuity of surgeons has hitherto contrived, to effect this purpose, seem totally contrary to the method laid down, in the course of this essay, for bringing it about, by absolute rest and total inaction. It has been thought, indeed, that the exciting of inflammation, would be likely to procure adhesions between these solid parts. This reasoning has been founded on analogy, from considering the effects which inflammation frequently has on the fleshy parts. Injections, caustics, and setons passed through the joint, in cases of diseased articulations, have all been tried upon this principle. I must, indeed, confess, that I have tried them myself, and seen them often tried by others, without success. If the author's ideas of forming an ankylosis are just, as we may conclude they are from the facts he adduces hereafter in support of them, (some of which I have been witness to,) it will appear, that all the methods before proposed for this purpose, have rather impeded than forwarded it; so difficult is it to know,

know, how to direct the operations of nature. If the method here proposed should hereafter prove generally successful, many limbs will probably be preserved, as will appear from that part of this essay which treats on the effects of rest in surgical disorders.

(14) The practice of using motion in fractures of the patella and olecranon, in order to prevent an ankylosis of the joint, which was almost always the consequence of the old method of treating these complaints, was first made use of, as I believe, by Mr. WATSON, *Surgeon to the Westminster Hospital*, though I know not that he has ever laid any claim to this very great improvement in the art of Surgery. So far I am certain, that I have seen him follow this practice above five and twenty years ago. Let me however be permitted to observe, that there is no necessity for waiting till the twenty fifth day, in order to begin moving the joint. Mr. Watson's method, in fractures of the patella, which I have always followed since I have been in practice, is to bring the fractured extremities as near as possible to each other, and to put on such a bandage as shall only allow of a very obscure degree of motion in the joint. But this obscure motion he permits his patients to exert on the third or fourth day after the accident, by directing them to rise out of bed, and walk gently about the room, with crutches, a little every day, till the union is sufficiently firm to allow them to bear on the ground. From following this method, I never saw the least inconvenience; but, on the contrary, the motion of the joint became perfectly free, after the consolidation of the fracture, even though there were a considerable interval between the fractured extremities. Let me be allowed to adduce a case, in confirmation of the utility of this practice. About two years ago, I attended the son of Sir Arch. Ed——, who had accidentally fractured the upper part of the olecranon; a case which does not occur near so often as the fracture of the patella, and that for obvious reasons. The fracture was attended with much swelling and contusion, which prevented me from discovering it till some days after the accident, though I suspected what had happened from the first. When the swelling and tension were removed, the bones, in this young habit, had already begun to shoot out
some

some callus, which prevented me from carrying the arm back to its full degree of extension. I brought it however, on the first time of applying the bandage, as near to a straight line as I could, and maintained it in that position, by supporting it close to the side of the body. In three days time, I took off the bandage, and found I could extend the arm much straighter than at first; I therefore gave the joint a very gentle degree of motion, for the space of a quarter of an hour, and then applied the bandage again. In this manner I proceeded every second or third day, renewing the bandage, and giving, each time, more and more motion to the joint, as the danger of displacing the fractured parts diminished. At length I succeeded in bringing the arm perfectly to the straight line, and when the young gentleman got well, which was in about six weeks after the application of the bandage, he had as free a motion and use of the joint as ever. I am apt to think the cure, in these cases, will be much more speedily performed, by adopting this method, than by waiting till the twenty-fifth day, before we begin moving the diseased joint.

(15) Spirituous liniments almost saturated with soap, and united to the active volatile alkaline spirit, have always succeeded best with me, in preventing or curing diseases of the joint. If camphor be united with them, it seems to make them infinitely more efficacious; for camphor, besides the great volatility of its particles, seems to possess a peculiar sedative quality, which renders it a very proper application in all inflammations, and in all cases where pain must be mitigated. — This method indeed, joined to fumigations, fomentations, and stupes, with vinegar, seems, as Dr. CHESTON has very well observed in his *PATHOLOGICAL OBSERVATIONS AND ENQUIRIES*, to be the most likely way to succeed in the cure of those dreadful disorders the knee joint is subject to, and which, when they are incipient, are termed white swellings. One circumstance may perhaps be added, which is, that friction itself, *gentle* friction I mean, may be as efficacious in bringing about the desired end, in these cases, as any of the other methods. This indeed is a circumstance very necessary to be attended to, for which reason, I always direct

rect the embrocations made use of, to be employed very freely, and the friction exerted with them to be continued for a long time, and very frequently renewed. It seems to be as necessary, in the practice of Surgery, to know for how long a time, and how frequently we should employ the means we may propose for the cure of any surgical complaints, under different circumstances, as it is in physic, to ascertain the proper doses of medicine, and their repetition, for the relief of internal disorders, in various constitutions. 'Tis much to be lamented, that both medicine and surgery are still very imperfect in this particular.

(16) In cases of rigidity also, most commonly remaining in the tendinous parts, after violent contusions or fractures, I cannot too much recommend the use of frictions, with oily, volatile, and saponaceous applications, and a steady perseverance in the use of them. I have frequently seen fractures and contusions about the wrist, which, after a long time, have left the flexor tendons of the fingers, in particular on the inside of the fore arm, in a state of considerable swelling, pain, and stiffness, insomuch, that after all the bones were firmly and evenly consolidated, there has appeared as great a degree of deformity as if a luxation or fracture subsisted still*. The embrocations before mentioned, are usually

* This deformity of the wrist does not seem to be properly understood. It is much more frequently met with, among people advancing in years, (particularly women) after falls, than in the earlier part of life, and seems to me to arise from a rupture of the ligaments, which, in a natural state, preserve the symmetry of this joint. Hence the radius drops inwards, while the carpal bones seem to be thrown outwards. Whoever has seen the true dislocation of this joint, which however is always to be reduced with the greatest ease, will readily distinguish the two cases. From repeated experience I have found, that the best method to prevent this deformity is, after making a moderate extension, and bending the hand inwards, so as to relax the palmaris muscle, &c., to pass a bandage, pretty tight, round the lower part of the arm and wrist, and then over the back of the hand, so as to put the latter into a declining state; by this means the radius, which causes the greatest part of the deformity, is raised to its proper place. If, afterwards, a splint of some strength be applied on the back of the arm, and extended about two inches over the joint of the wrist, it will serve as a fulcrum, by being inclosed in another roller, to keep the parts in a proper situation. It is frequently proper to include a compress, in this latter bandage, on the projecting part

usually ordered, to relieve these troublesome and disagreeable complaints, but I think, sufficient stress is not at the same time laid upon the free use of these liniments, and the long continuance, as well as frequent repetition, of the friction that is to be used with them. This I believe to be the reason why these complaints generally last so long, and are sometimes never removed. The patient, wearied out with the inefficacy of means, which seem to fail merely from being improperly used, grows importunate with the surgeon, to try something else. The surgeon, unwilling to see his art baffled, and not perhaps attending to the true reason of it, frequently changes his best methods for others infinitely less likely to succeed; but to which, report, and the experience of others, seem to have given a sanction. The officiousness of idle people, who are continually talking of the numberless fine cures they have seen effected by goose grease, steeping in bullocks' paunches, and other such methods, often induce patients to try them, in preference to a better method, ordered by a skilful surgeon, which, had they persevered in, or used it properly, would, in all probability, have had the desired effect. Time alone sometimes gradually brings about the recovery of the parts.

(17) ROTROU'S SOLVENT—The composition of ROTROU'S *solvent* is given as follows: "Crude antimony, mixed with three parts of nitre, and exposed to the fire in a crucible, loses all its phlogiston by the action of the nitre. The mixture enters into a paste like fusion, it is then poured on a marble, pulverised, and kept in a bottle." *Baumé's Manual of Chemistry*; p. 206*.

(18) Burnt

part of the radius, taking care, however, that it shall not press on the radial artery. The back of the hand, and the arm, above the bandage, in general, swell pretty much; but, to prevent inflammation, the bandage should be constantly moistened with Goulard water, or some other topic. It should farther have been observed, that the radius is frequently fractured in this case, but not always in the same place. E.

* In the account of ROTROU'S *Medicines* given by ASTRUC, at the end of his fourth book, is the following combination of nitre and antimony, under the name of PULVIS LIQUANS:

N

R. *Reguli*

(18) Burnt sponge is one of the remedies that seem to act in this manner, in the cure of this disease. If persevered in for a long time, and used very freely, I am inclined to think it one of the most useful alkaline and absorbent medicines against this complaint, and also against the bronchocele, in which latter instance, I have sometimes used it with success. But to do any good in these last cases, it must be used much more freely than it generally is. I have had patients who have taken more than an ounce of it every day.

(19) I find, in LIEUTAUD's *Synopsis*, and WECKER's *Antidotarium Speciale*, the following plasters of VIGO.

EMPLASTRUM DE RANIS, vel DE VIGO, *cum mercurio*, maxima rerum copia exsurgit. Primo, coquuntur in vino & aceto ranæ & lumbrici, cum radicibus ebuli & enulæ, floribus chamæmeli, lavandulæ, &c. Dein seorsim liquantur cera & axungia, styrax & terebinthina, cum oleis ranarum, lumbricorum, liliorum, &c. Quibus fufis adduntur olibanum myrrha, euphorbium & crocus, cum oleo essentiali lavandulæ. Tum decocto & liquamini, simul mixtis, & ulterius coctis, adjicitur mercurius ope terebinthinæ & styracis extinctus; ut ex omnibus notissimâ arte subactis emergat emplastrum, quod inter eximia resolventia & incidentia haud immerito decantatur. Ideo conducit in tumoribus cysticis & anomalis; gummata venerea evincit; glandulis scrophulosis opitulatur, &c. Postremo nonnunquam adhibetur amplitudine congruâ, ad movendam salivationem, vel oppugnandum virus venereum adhibetur, atque in hunc finem paratur cum duplicato vel quadruplicato mercurio, ut ad hoc opus efficacius evadat. LIEUTAUD, p. 897.

R. *Reguli antimonii optime preparati et in pulverem triti.*
Nitri purificati et in pulverem seorsim redacti ana ℥iiss.

These two powders being mixed, throw a spoonful at a time into a red hot crucible, and let the whole calcine for six hours. This is afterwards to be pulverized and kept in a glass vessel. To complete the process, we are directed to add to each pound of the powder, warmed over the fire, six ounces of strong cinnamon water, drop by drop, stirring it continually till the whole is evaporated. E.

DIACHYLON

DIACHYLON CUM GUMMI VIGONIS.—R Rad. Althæ. ℞ss—Semin. Lini Fœnigræci ana ʒj, Violarum—Sem. Malvæ—Sem. Althæ—Sem. Cydoniorum ana, ʒss—Sem. Pŷyllii ʒij—Rad. Ireos ʒij—Olei Chamæmelini—Olei Anethini—Olei Liliorum—Olei Lini—Olei Irini ana ʒiij—Pingued. Gallinæ—Pingued. Anatis—Pingued. Anseris ana ʒiij—Olei Amygd. dulc.—Oefypi humidi—Succi Glycerrhizæ ana ʒx—Terebinthinæ ʒiss—Sevi vituli ℞ss—Lithargyri auri ʒx—Bulliant omnia simul baculo agitando, usque ad consumptionem mucilaginis. Deinde cum cera alba, quantum sufficit, fiat ceratum molle addendo Sagapeni—Opoponaci—Bdellii mollis—Galbani ana ʒiij—Hammoniacy ʒv dissoluta in aceto, fiat Emplastrum.

EMPLASTRUM DE MINIO VIGONIS.—R Olei rosati adorati ℞ss—Olei Myrtini—Unguenti Populeonis ana ʒiv—Pinguedinis Gallinæ ʒii—Sevi Castrati—Sevi vaccini ana ℞ss—Pingued. Porcinæ ʒvij—Lithargiri auri—Lythargiri argenti ana ʒiiiss—Minii ʒiij—Cerussæ ʒiv—Terebinthinæ ʒx Ceræ q. s. Fiat emplastrum secundum artem, tendens ad nigredinem. WECKER, *Antid. Spec.* Lib. II.

EMPLASTRUM DIABOTANUM.—Forte plus æquo celebratum, nomen fortitur ab ingenti plantarum copiâ, quæ ejus compositionem ingrediuntur; inter quas notandæ veniunt; cicuta, valeriana, chamæpithis, angelica, raphanus rusticanus, cucumis, schrophularia; chelidonium, gratiola, &c. quorum decoctum, addito nonnullarum succo, evaporationi committitur; ut adjiciatur gummi ammoniaci, galbani &c. in aceto scilicito solutio. Dein admiscuntur lythargyrus; olea lumbricorum, catellorum, &c. in aqua cocta. Quæ omnia mixta postea recipiunt sulphur, ceram, styracem & picem; non secus ac pulverem radicum ireos, cyclaminis, serpentariæ, hellebori, ari, aristolochiæ, &c. baccarum lauri & nonnullorum feminum; varia gummata, camphoram, oleum caryophyllorum, &c. Quid emergat e tanta rerum farragine vix definiri potest. Huicce tamen emplastro insulæ compositionis, tribuuntur vires resolventes, emollientes & demulcentes; nec refragatur experientia: præcipuè deprecatur adversus tumores cysticos, glandulas induratas, ganglia, &c. LIEUTAUD, p. 810.

(20) In scrophulous ulcers attended with caries, I have used, with good success, a small portion of the magnes arsenicalis, which I have applied to the foul ulcers and carious bones. The idea of using this medicine in scrophulous ulcers, was suggested to me, from a surgical manuscript I found at the British Museum, which advised it, as a specific in those cases. But though apparently a very useful application, and indeed more so than any other topic I have ever tried, yet I cannot take upon me to say, that it deserves this appellation. There were also some other curious matters I extracted from manuscripts in that collection, and of which a full account has appeared, in the work which I have published, on the treatment of cancerous diseases.

(21) I knew not, till I read this pamphlet, that volatile alkalis had been proposed by Mr. Perilhe in the cure of this disease; but, for some years past, it has been my constant practice, both in private, and at the Westminster Hospital to give strong volatile medicines in the cure of the venereal disease. The volatile I used formerly to prescribe, was the volatile tincture of guaicum; and this I did with a view to assist the action of mercury; for I have always held, that in order to render mercury more efficacious in the cure of the venereal disease, it was necessary to excite the powers of it by warm and stimulating medicines. By this combination, I have succeeded in curing several venereal complaints, which subsisted after the patients had been salivated, and had persevered in a course of mercurial medicines for a very considerable length of time, I consider salivation, indeed, merely as an overdose of mercury, and cannot think it contributes the least, in itself, to the expulsion of the virus. But these, and several other observations, which reading and a careful practice has supplied me with, on the venereal disease, would lead me too far here. I shall only hint at one particular case, of a terrible venereal cancer, that had eaten away the greater part of the penis, and the cure of which seemed to prove, that the cancerous ulcer, sometimes succeeding to this disease, requires a different treatment from the venereal virus itself; and that, although the cancer should be cured, the virus still remains in the body. The patient I allude to, had taken

a prodigious quantity of mercury before I saw him. He had had many universal symptoms of the disease, which had all yielded to this treatment; and there remained only, when he applied to me, this terrible cancerous ulcer before mentioned, which had already eaten away one half of the penis, and was spreading very fast on the prepuce towards the integuments of the abdomen. With great difficulty, I succeeded in putting a stop to this cancer, without a grain of mercury, by methods which I shall give a full account of on another occasion. To my great surprize, however, no sooner was the cancer healed, than my patient was seized with venereal symptoms all over the body, viz. ulcers in the throat, universal pains, swelled legs, and nodes upon the bones. All these, however, yielded readily to a prudent administration of mercury, joined to active volatile stimulating medicines and the warm bath; and the patient, at this day, three years from the time of his being under my care, enjoys a perfect state of health.

(22) The best instrument ever invented for these cases, is that published in the Memoirs of the Academy of Surgery, under the name of Mr. VACHER, and it seems to act entirely upon these principles; for, by keeping the spine, as much as possible, in one continued state of extension, it not only prevents the vertebræ from pressing upon each other, but likewise hinders them from moving one upon the other, and consequently in some measure maintains them in a state of rest.

(23) It is needless to expatiate upon the novelty and excellence of all these observations respecting abscesses proceeding from carious vertebræ of the back or loins, or, in other words, of what we familiarly call *psoas cases*, which destroy so many patients at all periods of life. But these call to my remembrance a remarkable case, which fell under my care in the *Westminster Hospital*, and the event of which I could never satisfactorily account for. This case is related at large in my *Essay on Abscesses*, page 128.

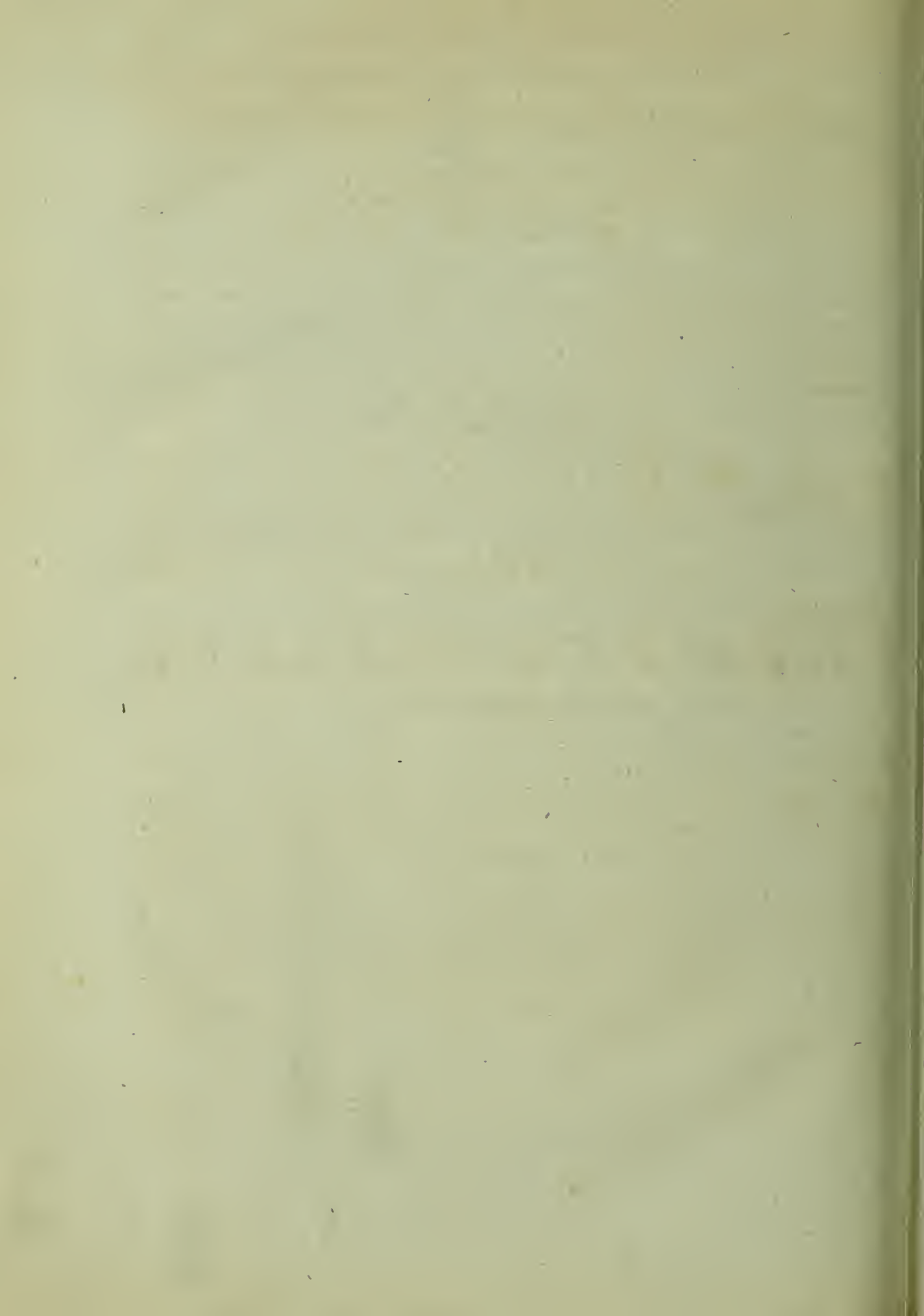
(24) From

(24) From this observation of the possibility of a limb being in motion, while the circumference of an ulcer or sore in it, may be at rest, we may account for the utility of bandage, in the cure of ulcers of the legs. Proper bandage answers the very purpose of keeping the ulcer, and the parts about it, steady and at rest, notwithstanding the motion that may be given to the limb. But we must observe, that an upright posture, by forcing the lower extremities to support the whole weight of the trunk, counteracts the good effects of bandage; so that whatever lateral motions of the limb we may allow our patients, in ulcers of the lower extremities, we must take great care to confine them to a horizontal posture. It is evident this cannot extend to sores in the upper extremities, for the weight of the body not pressing upon them in an upright posture, the rest of the part is only to be attended to in these cases.

(25) The reader will find in the annexed *Memoir on Counter-Stroke*, all the different cases to which the author alludes.

(26) BALSAMUM COMMENDATORIS, *Beaume du Chevalier*, vel, a nonnullis, *Beaume universel*, est tinctura spirituosâ radicis angelicæ & florum hyperici; in qua peracta digeruntur primò myrrha & olibanum; dein styrax, benzoinum, balsamum tolutanum, aloë & ambra cineritia. Crebrius in usum venit illud balsamum; ac pro exquisitiore stomachico & carminante habetur; roborantium, & præsertim cephalicorum classem subit. Idcirco confert in cardialgiâ; dolores a flatulentiâ compefcit; somnolentiam arcet; diuresim movet, &c. Dosis a guttis quatuor, ad viginti, in juscûlo, vino, syrupo, aliove haustu. Insuper eximium vulnerarium & anteputridum externum censetur; nec infimum locum tenet inter res solventia: ideo faustè admovetur vulneribus recentibus, contusioni & gangrænâ: nec minus auxiliatur partibus paralyticis. LIEUTAUD, p. 673.

ON THE
E F F E C T S
OF
C O U N T E R - S T R O K E S.



AN ESSAY

ON THE FOLLOWING

PROPOSITION.

TO EXPLAIN THE EFFECTS OF COUNTER-STROKES
ON THE SEVERAL PARTS OF THE BODY, EXCLUSIVE
OF THE HEAD, AND THE METHODS OF RELIEVING
THEM.

A THEME so interesting, could only be proposed by the ACADEMY OF SURGERY: and it required the sagacity of that celebrated body, to perceive, in the discussion of a question, which to ordinary surgeons may possibly appear barren of matter, a series of facts and practical inferences, well calculated to extend the boundaries of an art, the improvement of which is their sole object, and the rational exercise of which, tends greatly to relieve the sufferings of mankind. Powerful motives these, to excite emulation among competitors for a prize, to be awarded by the hand of Science!

To ask an explanation of the effects of counter-strokes on the several parts of the body, exclusive of the head, is to beg the question concerning the existence of these counter-strokes, and of the mischiefs that ensue from them. To demand an exposition of the means of relieving them, is to require of those who may attempt to solve this important question, a methodical and considerate application of the means which the art may suggest to a man of knowledge, who, in the effects of counter-strokes, perceives at once, both the connection between the cause and the effect, and the mechanism by which the injuries he sees have been produced.

If it be a matter of surprize, that the existence of counter-strokes in the head, should have appeared problematical, even at a time when supported by reason and experience, it is still infinitely more astonishing, that the efforts of counter-strokes on other parts should have been in some sort overlooked, and that no writer should refer, at least explicitly, to this kind of cause, numbers of accidents which he must have seen (^e). Although it must be acknowledged, that practice is not so much affected by this omission, as might be imagined, on account of the number of cases in which a knowledge of the mechanism by which the accident was occasioned, could have little influence on the mode of cure to be pursued, yet there are cases in which a knowledge of this mechanism can only suggest, with propriety, the curative means to be employed. This is sufficient to render a solution of the proposed question very interesting, although it should not even convey to the mind that degree of satisfaction, which we always experience, when we are convinced of having discovered the immediate relation of the cause to the effect.

Counter-strokes, in the several parts of the body, exclusive of the head, are so frequent, that diseases of the utmost importance in surgery, may be considered as being produced by them. I shall endeavour to prove this proposition by facts, rather than by argument. Besides those which I have collected from the experience of some great masters in the art, whom I have attended, there are no inconsiderable number which have occurred in my own practice, and which all contribute in the most palpable manner

ner to evince the pernicious effects of these counter-strokes. If therefore, I can only give a rational analysis of these facts, accompanied with a mode of cure, adapted to the nature of these accidents and their cause, I flatter myself that I shall answer the two requisites of the proposition; but, sensible as I am of the difficulty of the undertaking, of my own insufficiency, and of the discernment of those who are to decide upon the subject, I am excited to engage in the attempt, rather by a desire of shewing my zeal for the improvement of the art, than by any hope of success in the enterprize.

A counter-stroke, taken in the most extensive sense, is a shock, which, from the part immediately stricken, is transmitted to a greater or less distance, and which produces, in its progression, mischiefs more or less evident; while the part which first received the shock, often remains uninjured.

In a more confined sense, as we generally consider it in the first instance, a counter-stroke is a shock which is conveyed from the part immediately stricken, to other parts, and produces in them the same mischiefs, which the body giving the shock would have occasioned, if these parts had been immediately exposed to its action ^(b).

When we are once acquainted with the laws, according to which, motion communicates itself and is lost, and with the circumstances necessary to occasion a congeries of solid fibres, to yield more easily in one place than in another, we may form a sufficiently exact theory of the effects of counter-strokes on the hard parts. Several facts will afford me the opportunity of elucidating the mechanism of these counter-strokes; which will be better understood, when it shall only be an explanation of the manner in which such and such mischief may have been produced, in a part distant from that which has received the first shock. Thus, after having pointed out the effects of counter-strokes on the different parts of the body, exclusive of the head, I shall speak of the proper mode of treating them, according to the nature of the mischief

which may have been occasioned ; and that I may proceed with order, this essay shall be divided into two parts.

In the first, I shall explain the effects of counter-strokes on the several external parts subject to the action of this cause, and shall point out a method of cure adapted to the cause, to its effects, and to the accidents which are, or may be, the consequence of it.

In the second part, I shall treat of the effects of counter-strokes upon several of the viscera contained in the cavities of the human body, beside that of the cranium ; and shall indicate the mode of treatment that may be used, with the greatest probability of success, against the injuries that are occasioned by them.

PART

P A R T I .

IT is evident from facts, that the principal pieces which enter into the composition of the trunk, and of the extremities of the human body, are subject to the effects of counter-strokes. Those especially which constitute the lower extremities, are the most liable to them, for which reason, we are naturally led to begin with examining the mischiefs that may be produced in them by such a cause, and the mode of relieving them. But before we proceed to this part of the question, it may be proper to notice some preliminary facts, calculated to explain, almost intuitively, the mechanism of counter-strokes, and the connection between their effects and the cause that produced them. Any part of the machine may sustain a shock, whether a body put in motion shall strike against the part, or whether the part itself shall strike, with a certain velocity, against a body at rest. This being premised, let us observe,

1st. That the feet, at every step of progressive motion, receive shocks which are conveyed, without any sensible effects, along the inferior extremities, the spine, &c.

2^{dly}. That these small shocks, which are nothing in the instance of habit we have been mentioning, are more sensibly felt in leaps, and may
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be attended with many mischiefs in passing through the parts to which the shock is conveyed.

3dly. That in falls on the feet, it often happens, that the shock is sufficient to produce accidents, which require the assistance of art; but in this respect, the accident is always in proportion to the height of the fall, and to the state of the parts which receive the motion, as we shall make it appear in a future discussion.

Man is destined to walk upright, to run, to leap; and is therefore exposed to all the bad effects that may result from the kind of shock we have been speaking of. Accordingly, we cannot behold, without admiration, the precautions which nature has employed, in the manner by which the pieces that compose the lower extremities and the trunk, are articulated with each other, in order to prevent the invincible resistance which the feet meet with on the ground, from producing (at least in ordinary instances) any mischief in the bony parts constituting either these extremities or the trunk; and also in order that the important viscus contained in the cavity of the cranium should be preserved from any shock sufficient to disturb its organization. A cursory review of these objects will enable us the better to understand all the contrivances of nature to elude the effects of counter-strokes that may be transmitted through this channel.

The bones of the tarsus and metatarsus, are formed and articulated in such a manner, as to leave a hollow of a certain depth in the sole of the foot; a cavity from which nature derives other advantages beside that of making a passage for tendons, blood-vessels, and nerves; for this hollow forms a kind of arch, the parts of which being moveable upon each other, may give way a little in yielding to the motion of the upper parts that press upon them; the motion, therefore of these parts being in some measure destroyed here, they retain the less of it.

The cartilages with which the articulating surfaces of the bones of the foot and leg are covered, destroy also a part of this motion, so that it is much weakened when sent away from thence, or when we consider it at the articulation of the leg with the thigh ; where the cartilages covering the extremities of these bones, and the intermediate femilunar cartilages, evidently concur in the same effect. Hence it may be concluded, that the motion communicated to the upper parts resting upon the thigh, hath already lost much of its force, when we consider it in the articulation of the thigh with the os innominatum, where we meet with fresh cartilages, which absorb still more of the motion. But the circumstance which absorbs the most of it in this place, is the obliquity with which the head of the thigh bone bears upon its neck ; for by means of this disposition, the two ossa innominata, by the quantity of motion still remaining in the upper parts, press upon each other forwards at the symphysis of the pubis, and laterally upon the os sacrum, at the point of their articulation with this bone. Now, we know, that at these points of union, there are some very thick cartilages ; and by tracing the motion along the spinal column, we observe with what art nature hath articulated and arranged the pieces which compose it, to diminish the violence of this motion ; so that we are no longer surprized, that the motion of so large a mass as the human body, accelerated even during the time of a fall from a considerable height, should be reduced almost to nothing, when transmitted to the brain, by the resistance which the feet have met with.

We are not to suppose, however, that the cartilages of the joints, the ligaments that surround them, and the motion of the bones over each other, are the only circumstances that concur in this matter ; the muscles have also their share in destroying the motion of the upper parts over the lower ones, striking against the ground : for notwithstanding the admirable arrangement of the pieces that compose the spine, the brain would receive, in the most common leaps, a commotion sufficient to disturb its organization, if, at the instant of the shock, the motion were conveyed in such a direction, as that the trunk and extremities should be in a straight line ; but fortunately this is a circumstance
which

which cannot often happen. The lower end of the thigh bone, is generally forced to make an angle, more or less obtuse, with the tibia, according to the violence of the fall ; which angle would even become so far acute, as that the buttocks would come to the ground, unless the muscles, known by the name of extensors of the leg, exerted themselves to oppose this, or rather, unless they gave way only by degrees, and to a certain point^(c).

This first flexion necessarily brings on another, that of the trunk forwards on the thigh ; a flexion which is moderated by all the muscles fixed in the tuberosity of the ischium, otherwise the head would strike against the knees.

It is sufficiently evident from what has been said, that in all instances of leaps or falls upon the feet, the spinal column must be bent forwards, and that the head then tends to fall downwards and forwards, by describing a curve ; but the muscles which serve to extend the head, the back, and the neck, are at this instant thrown forcibly into action, and retain the trunk and head in such a manner, that the motion remaining in them can only (except in falls from a very great height) bend the head and trunk forwards to a certain degree ; from whence it is evident, that in cases of leaps or falls upon the feet, most of the muscles of the human body are employed in destroying the greatest part of the motion, by allowing the bones to which they are attached, to yield only by degrees, and successively, to the impulse, or action of the weight.

Notwithstanding this admirable arrangement, nature is still frequently in default. The direction of the shock, though a moderate one, is sometimes such as to elude the action of most of the agents which have been prudently employed to lessen it ; or else the motion is too violent to allow these agents to absorb a sufficient quantity of it to prevent mischief in some of the part through which it is transmitted. This fatal truth is

but too well evinced by numbers of facts ; but as, in the instances above mentioned, the lower extremities are the parts that receive the first shock, which is conveyed by them to the trunk, we shall first examine the effects of counter-strokes on the several pieces which compose them. We shall then trace the effects of a similar cause upon the bones which concur in forming the trunk ; and lastly, we shall explain the mischiefs that may be produced from counter-strokes on the several parts that constitute the upper extremities. In treating each of these points separately, we shall point out the method of cure adapted to the nature of the mischief produced by the counter-stroke, and to the accidental circumstances attending it. This mode of proceeding presents us with a very natural division of the first part of our essay.

P

SECTION

S E C T I O N I.

TO EXPLAIN THE EFFECTS OF COUNTER-STROKES
ON THE SEVERAL PIECES CONSTITUTING THE LOWER
EXTREMITIES, AND THE MODE OF CURE ADAPTED
TO THEM.

FALLS upon the feet, and leaps, being the most ordinary causes of the violent counter-strokes which the lower extremities sometimes suffer, it is natural that the effects which this cause may produce upon the parts most contiguous to those which receive the shock, should first engage our attention ; such as those which concur in the formation of the ankle joint.

The manner in which the lower extremities of the bones of the leg are articulated laterally with the astragalus, the extent of surface which this bone presents to the articulating cavity which receives its upper part, the motion of the other bones of the tarsus with which it is articulated, the great number of ligaments which unite these bones to each other, every circumstance shews us, on the part of nature, a multiplicity of contrivances employed to elude, in the best manner, the effects of counter-strokes in the articulation of the leg with the tarsus ; insomuch, that although, in leaps or falls upon the feet, it be the joint nearest to the

part receiving the shock, it seldom suffers any injury from it, this joint hath sometimes, however, experienced mischiefs originating from such a cause.

A young man, in leaping from about eight feet high, having rested much more on the left, than on the right foot, felt, at the instant, a pain, which though not violent, was succeeded by a numbness, and a little difficulty in motion. The vivacity of youth made him pay little attention to these symptoms which were at first slight; but the pain, as well as the difficulty of motion afterwards increasing, and the foot being much swelled about the joint, he applied to a surgeon, though not till about two months after the accident. Every mode of relief supposed to be best adapted to the case was tried in vain for four months; the mischief increased. Several abscesses were formed in the vicinity of the joint, which being opened, were found to communicate with the inside of the articular cavity, into which the probe might be easily passed. The remedies most proper for the patient in his present state, having been tried without effect, and the fever increasing, it was resolved to amputate his leg. Upon examining the joint, I found the astragalus, and the articulating surfaces of the bones of the leg, affected with caries.

A few bleedings in the first instance, above all things rest, and the application of resolute spirituous topics to the part, would certainly have prevented those symptoms which led to the amputation of the limb; these are the means at least, which I have always employed, with the greatest success, in similar cases. It must, however, be acknowledged, that spirituous resolute topics are not always proper. They should be laid aside whenever the pain is considerable, and cataplasms made of the pulp of emollient plants should be substituted for them; and when the pain is assuaged, embrocations with the saturnine soap may be used, or compresses dipt in water quickened with sea salt, and with salt ammoniac, to which a little brandy being added, may be applied to the part. It is very unfrequent in leaps or falls on the feet, attended with bad symptoms, that the foot should have borne perpendicularly enough on the ground, to occasion these symptoms always to arise from the effects of counter-

counter-strokes in the joint; if the foot be twisted ever so little to one side, there will be, an extension of the ligaments on the opposite side; there will be, what is called a wrench, and this accident can at most only be reckoned an effect of the counter-stroke taken in its most extensive sense: the curative indications are, however, the same as those which have been just mentioned.

I shall only observe, that whenever, notwithstanding the use of these means, there shall remain, after the shock in the joint with extension and bruise of the ligaments, a permanent stiffness and swelling of the surrounding parts, oily and mucilaginous liniments, such as those of the unguentum althææ, animated however with a small quantity of brandy, may be tried with effect; or liniments made with the marrow of animals, quickened also with the addition of some spirituous topic. The part may likewise be bathed in tripe liquor, or in warm animal blood; and if all these remedies should prove insufficient to restore the joint to its suppleness, and to dissipate the swelling of the ligamentous and tendinous parts that surround it, no delay must be used in pumping artificially upon the part with hot water animated with sea salt and salt ammoniac; or in sending the patient to the waters of Aix-la-chappelle, Bourbon, Bourbonne, or any other of the same kind. In cases of relaxation of the ligaments, and habitual pain in the parts about the joint, with a partial ankylosis, complaints which are also often the consequence of counter-strokes, I have likewise used the following remedy with much success. Let the joint be surrounded with a bag full of plaister of Paris in powder, to which a fourth part of sea salt and of salt ammoniac must be added, taking care to heat the bag before its application, which must be frequently renewed. I have also employed with effect, a cataplasm made with the pulp of the roots of the consolida major, mixt up with honey, in equal parts, and spread upon tow. What is here prescribed for the ankle joint, is equally proper for the other parts of the body, whenever the effects of counter-strokes shall leave symptoms behind them which may require the use of such means. I shall therefore avoid repeating them, and shall only hereafter indicate those remedies that are the best calculated to relieve the urgent symptoms,

symptoms, taking it for granted, that the cases, in which the application of any of the different topics here proposed may be of advantage, will not be overlooked.

The counter-stroke in the ankle joint, may also give rise to a fracture of the fibula, the lower extremity of which, being forced a little to one side in an oblique fall on the feet, resists, while the weaker part of the bone gives way and is fractured, without however occasioning a luxation of the foot sideways. I have met with more than one instance of such fractures; for which reason, in all accidents of a fall upon the feet from any height, or even of a wrench, we must always examine whether the injury we perceive about the joint, be not complicated with a fracture of the fibula. It is rather difficult to discover this accident, when the lower part of the leg has begun to swell; the turning of the sole of the foot a little inwards, may be the effect of the extension of the ligaments, or of a diastasis, and not be an indication of the fracture of the fibula, which we must endeavour to find out by some more certain signs. The best way of doing this, is to grasp the lower part of the leg with one hand, while, with the other, we move the tarsus to each side; and with a little patience and habit, we shall distinguish the crepitation of the bone, which is the pathognomic sign of the fracture. The following fact will shew how necessary it is to make this discovery. A mason, having made a false step, felt an acute pain about the external ankle, which he thought to be merely the consequence of a slight sprain, and paid no great attention to it; he even continued to work, notwithstanding the swelling which came on the part, and the increase of the pain, which however became at length so violent, that he was forced to give over work on the third day after the accident; but not having recourse to any surgical assistance, he abstained only partially from motion, and applied, merely according to his own ideas, different poultices upon the part. At length being obliged to come to the hospital, he met with every assistance which his case required; but it was no longer time to think of discovering the fracture, the swelling was considerable, and already announced a suppuration formed about the joint, which soon manifested itself on the application of remedies proper

per to forward it. The abscess was properly opened, and the surgeon, examining with his finger the bottom of it, found that the external angle was broken off. Notwithstanding the good constitution of the patient, the free openings that were made, and the careful use of all the means that were the best calculated for his relief, yet he went through a series of accidents, which obliged him, about two months after, to submit to the amputation of his leg, as the only way to save his life.

But let us suppose that we should be called in time, and that the fracture of the fibula should be discovered, the treatment proper for such an accident is too well known for me to dwell upon it here. Let me only be allowed to observe, that in the first instance, we must carefully avoid applying a circular bandage on the fractured part. It is, indeed, evident that such a mode of proceeding tends only to push the fractured parts of the fibula inwards against the tibia, which is by no means the intention we should have in view: on the contrary, we must endeavour to keep them in apposition to each other, by preserving the natural distance between the two bones; and in order to effect this, we must first place, both on the outside and on the inside, on the spot that answers to the interosseous space, a slip of linen of a certain thickness, or a narrow splint well covered, in order that the circular bandage to be applied immediately over, may press a sufficient quantity of flesh between the tibia and fibula, to keep the fractured parts of the latter in exact apposition, and at a proper distance from the tibia. This mode of binding up the limb, answers nearly the same purpose, as if the circular bandage were put round the single bone fractured, which cannot be done. It is from having been witness, both to the accidents which have sometimes succeeded the immediate application of the circular rollers in fractures of the fibula (*d*), and to the good effects of splints first applied, that I insist upon this precaution, which is also indicated in compound fractures of the leg, which are themselves often the result of counter-strokes.

A man carrying a load, upon a sloping ground, made a hasty step, or rather a kind of spring, in which the whole weight of his body bore almost

almost entirely upon the right leg; the motion, losing itself in the ankle-joint, produced no apparent mischief there; but the tibia, the fibres of which are naturally rather arched forwards, gave way, and was broken just below its middle. The upper end of the fractured bone pierced the integuments, and pursuing the oblique direction of its motion, fixed itself in the ground.

This was a kind of counter-stroke, the mechanism of which is very evident, and for which it is easy to point out the means of cure; they are the same as those that are proper for every compound fracture of the leg, though arising from another cause. Accordingly, without considering the mechanism or cause of the fracture, I only attended to the circumstance of reducing it properly; this was done very exactly, after having previously set the integuments free, which were much upon the stretch. After this, the eighteen-tailed bandage was applied according to the rules of art; the patient was blooded, and restrained to a proper diet. At the usual period the suppuration came on, which from the fourth to the eleventh day, was plentiful. The portion of the tibia that was bare, had no unfavourable aspect; the patient's pulse and countenance were good; notwithstanding which he began to experience some shiverings; on the eleventh day he grew delirious; and on the twelfth, he had some convulsive motions in the lower jaw; a fever came on; a change took place in the limb; the symptoms were all aggravated, and he died on the fourteenth day from his accident (^c).

A student of sixteen years of age, in leaping a ditch, fractured his leg by the same mechanism as the man who was the subject of the preceding observation. The bones had also pierced the skin, and the youth being carried home to his parents, the fracture was very exactly reduced; he was blooded, and confined to a proper diet. He was attended very assiduously by one of my brethren in the profession, and myself; on the twelfth day, he was again seized with convulsive spasms in the lower jaw, accompanied with an obscure delirium; and on the thirteenth, he died. He is one of the three patients spoken of in the preceding note.

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The tibia, in particular, may experience, from the effects of a counter-stroke, another kind of fracture, of which the other bones are certainly but little susceptible. At least it does not appear impossible to me, but that, in a violent shock on the tibia, the compact substance of this bone may resist, while there may be a fracture in the transverse bony fibres, which compose either the spongy or the reticular substance. May not a rupture of some of the fibres of this last substance be occasioned by a fall on the feet, or by leaping from a certain height, while the body of the bone shall remain entire? May not an injury of this kind give rise to an abscess in the cavity of the bone, and to all the mischiefs which must attend such a complaint? The following fact seems to speak in favour of what is here advanced.

A young man, of five and twenty years of age, having received a violent blow on the broad surface of the left tibia, had nothing more than a contusion externally without fracture, which soon gave way to spirituous topics that were applied to it. He still continued, however, to feel an obtuse kind of pain, which seemed to come from the inside of the bone. He paid little attention to it for four or five months; but the pain, which then became more acute, was accompanied with a swelling of the bone, which increasing gradually, produced an inflammation of the periosteum and integuments, the matter of which bursting of itself, left a fistulous opening externally (*f*). By passing a probe into this opening, it was found to penetrate into the cavity of the bone. The patient being properly prepared, the exostosed part of the tibia was laid bare throughout its whole extent; the crown of a trepan was applied over the fistulous orifice in the bone, and the parts surrounding the exostosis, were removed by the gouge, chisel, and mallet. By these different proceedings, an opening was made through the bone, (which, though exostosed, was very hard) sufficiently large, to enable the operator to extract a piece of bone, eighteen lines in length, which being insulated in the medullary cavity, afforded us an instance of a true internal exfoliation (*g*).

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With respect to simple and compound fractures of the leg, they are most commonly the effect of counter-strokes, since all those which happen in the instance of falls, are seldom the result of a blow immediately applied to the part of the bone that gives way. But as they require no other treatment than that which is equally applicable to fractures in general, I shall proceed immediately to consider the effects of counter-strokes on the joint of the knee.

Although this joint may sometimes be exposed to the effects of counter-strokes, it must however be acknowledged, that, in cases of falls on the feet, the great surface by which the os femoris and the tibia are in contact with each other, and the intervening cartilage which is met with in the joint between these two bones, are contrivances well calculated to elude the effects of counter-strokes which the joint might suffer. The circumstance which renders these effects less frequent, and less to be apprehended, is, that the shock must be very violent in order to produce any mischief; and this could not be in the instance of leaps, or falls on the feet, unless the whole weight of the trunk bore directly upon the articulating surfaces of the tibia; that is to say, unless the thighs and the trunk, at the instant of the shock, should maintain that rectilinear position which would make the line of gravity of the upper parts bear upon the articulating surfaces of that bone. It is evident that such a position must be very difficult in a part which has so many joints and bendings as the trunk, and the inflections of which depend upon such an infinite number of muscles. But supposing even this position to exist, the effects of it would not be felt in the knee joint; they would rather take place in the articulation of the thigh with the os innominatum: the head of the thigh bone might be separated, and its neck fractured, on account of the oblique direction with which the weight of the body bears upon these parts; or if the shock were not violent enough to produce such effects, it might occasion a contusion in this joint. It might even happen, from the position above supposed, that the motion of the head upon the spinal column being suddenly stopped, might occasion a mortal commotion in the brain, even in those cases where the shock of
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the os femoris upon the tibia would not be sufficient to produce the least mischief at the part where these bones are connected. Notwithstanding this, the knee joint is much exposed to the effects of counter-strokes; but they are chiefly occasioned by falls upon the knee, or blows upon the patella.

Reason admits the possibility of counter-strokes with bad consequences, in this part, and facts confirm it.

A lad, of thirteen or fourteen years of age, having received a blow with a wooden shoe on the knee, while the leg was half bent, the contusion was scarce felt externally, notwithstanding which, he experienced at the instant, a sharp pain, which seemed to come from the inside of the joint. This pain was soon relieved; but he still continued to feel it in some degree, and a tumour appeared, which increased gradually, with a difficulty of walking. A fever came on, and the pain grew more violent about a month after the accident. It was at this period that the patient, who had hitherto received scarce any assistance, came into the Hospital, and was under my care. A few days after, the fluctuation being evident in a certain extent of the tumour, it was opened, and a considerable quantity of very fluid matter was discharged. It was thought at first, that it came only from under the integuments; but becoming more and more serous afterwards, and the wound not healing, mischief was suspected within the joint; and in order to determine the point, the bottom of the abscess was completely laid open; upon which a small sinus, leading into the joint, manifested itself. In vain, after this discovery, were all possible means tried to cure this young man; deterfve injections, a proper position of the limb, dilatation and opening of the capsular ligament, every thing proved unsuccessful. It being no longer possible to preserve the patient's life without amputating the thigh, which his parents would not consent to, he died some time after. The joint being opened, manifested a very advanced caries of the articulating condyles of the leg and thigh, with an almost total destruction of the crucial ligaments. The internal surface of the patella was affected only with a su-

perforial caries; and its external surface, which had received the stroke, had experienced no kind of alteration.

Effects similar, or nearly so, of counter-strokes in the knee joint, would undoubtedly occur more frequently, after violent falls on the knees, or sharp strokes on the patella, if proper means, which readily present themselves to the surgeon, were not used to prevent these consequences. Rest is the first of the remedies which it is proper to have recourse to in these cases; and the single precaution of avoiding, for a few days, every kind of motion of the knee joint, assisted with two or three bleedings, and the use of some emollient and anodine embrocations, such, for instance, as the balsamum tranquillum, or the application of some resolute cataplasms, would probably have prevented the mischiefs which I have just been giving an account of.

But the following case, is one, which more particularly proves, that falls upon the knees, do not always confine their effects to injuries within side the joint.

A woman, about fifty years of age, was brought to the Hospital after a fall upon the right knee; the patella was not fractured, but the parts surrounding it were much swelled; and the pain she felt in the motions of flexion and extension ^(b), might have been supposed to arise only from the violent contusion which the external parts had suffered. By careful examination, however, and repeated trials, I discovered an evident fracture of the lower part of the thigh bone, or rather a separation of its condyles. Fractures of the thigh very often arise from a similar cause; the kind of arch formed by the thigh bone, renders it, notwithstanding its strength, very liable to fracture, when in falling from a certain height, the inferior extremity of this bone is suddenly checked, while its upper part is still pressed upon by the weight of the whole body in motion. The mechanism of the fracture which then takes place, is easily understood; and the method of cure which it requires. It is exactly the same as if the fracture had been produced by a blow applied immediately to the

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the broken part. The treatment proper for these accidents is too well known, to make it necessary for me to enter into any details upon the subject. There is one observation, however, to be made; which is, that in a fracture from a counter-stroke, the bone being broken at the instant that the force which occasions the fracture, is superior to the resistance of the bone, the rest of the motion may be spent on other parts; while there are cases, where the shock, being applied immediately to the part where the fracture happens, continues to exert all its action upon the spot itself, after having produced the principal injury we have been mentioning. This circumstance may deserve some consideration respecting the cure of these accidents.

Although most of the fractures happening to the body of the thigh bone may be the effect of counter-strokes, they are not, however, always owing to this cause. But the same cannot be said of fractures which happen to the neck of this bone, since these are never the consequence of a blow received immediately upon the part. The circumstances under which this fracture usually occurs, demonstrate sufficiently that it must always be the effect of a counter-stroke. It hath often been produced by a fall upon the great trochanter; and it is sometimes occasioned by a fall on the feet, or on the knees. It may be observed however, in this respect, that the fracture of the neck of the thigh bone will scarcely happen, if the two knees, or the two feet, bear at once and equally upon the ground, even supposing the body to be maintained in that straight line which would make the whole weight of the upper parts press upon the heads of the thigh bones; and this, 1st, because the effect being divided between the two thigh bones, would be lessened; and 2dly, because this effort being conveyed obliquely over each of the heads of these bones, the ossa innominata may, in some measure, glide over them⁽ⁱ⁾; a circumstance which will render the fracture of the neck of the thigh-bone more difficult. But when the weight of the body bears only upon one extremity, although the fall be not even from any great height, yet the motion of the upper parts being entirely spent upon the neck of the thigh bone, which is in an oblique direction to the line of gravity passing through

through the head of that bone ; and the os innominatum not being able to glide over that head, because it presses upon it perpendicularly, this gives us the reason, why the neck of the thigh bone is more readily broken, under this circumstance than under the former. Suppose the quantity of motion to be absorbed were the same in both instances, a fall, or a violent blow on the great trochanter, may likewise, and in fact often doth produce this fracture. In the accident of falling on the feet or on the knees, the inferior extremity of the thigh bone being stopt, while the head of it is greatly pressed by the upper parts in motion, tends more and more to form the arch, and breaks the bone at its neck, where the arch is already begun. In the instance of a fall on the great trochanter, on the contrary, the head of the bone resisting in its cavity, while the most prominent part is stricken externally, the intermediate piece, which is the neck, tends to resume the straight line, and is fractured by a mechanism the reverse of the former. But still the accident is the same in both cases, and requires the same treatment. The proper modes of reducing this kind of fracture, and those which can best maintain the reduced pieces in their situation, are then to be adopted. These are fully discussed in Mr. SABATIER's paper in the fourth volume of the Memoirs of the Royal Academy of Surgery, at Paris. I shall only add to the wise precepts contained in this paper, that besides the junk placed on the internal part of the thigh, it will be proper to place two other junks on the outside, which extending from beyond the feet, proceed far above the hips, passing one above, the other below the great trochanter. The upper extremity of these junks being fastened by a bandage passed round the body and the hips, the motions of the thigh are by this contrivance admirably well confined. By this additional precaution, accompanied with the most absolute rest, I have succeeded in curing, with tolerable ease, some fractures of the neck of the thigh bone, which have left only a very slight degree of lameness after them. It will be proper also to recollect, that this fracture may be complicated with contusion in the joint, or on the great trochanter ; and that this complication requires attentions which I shall have occasion to speak of hereafter.

It must not however be supposed, that a fall, or even a considerable shock on the great trochanter, are always capable of producing a fracture of the neck of the thigh bone. In order to accomplish this, it is necessary that the direction of the shock should coincide with the force of the motion impressed upon the part, if this motion be made in the direction of the fibres of the neck of the thigh bone; otherwise, the head of this bone would sooner be crushed against its cavity, or the cavity itself would be broken, rather than the neck of the bone. But if the direction or sum total of the motion be such, that the fracture cannot be the result, then the counter-stroke produces another kind of injury, frequently more dangerous than the fracture; that is, the contusion of the joint, and particularly the squeezing or bruising of some of the parts that are contained in it. The round or inter-articular ligament, which, in progressive motion, is never squeezed, may become so in a fall, or in a shock upon the great trochanter, when the direction of the motion tends forcibly to push the head of the femur immediately upon the part from whence this ligament proceeds. The synovial glands, which form a considerable mass in this joint, may also be roughly squeezed, between that part of the cavity which they occupy, and the head of the bone driven with force against them; hence will arise accidents proportioned to the nature of the injury done to the joint.

In the first instance, pain, swelling and inflammation of the parts contained within the joint, always manifest themselves, accompanied with a difficulty of motion in the limb; and the intenseness of the symptoms is proportioned to the violence of the shock, and to the greater or less irritable state of the patient. The pain is often acute in the beginning, and is attended with a total inability to move the limb. At other times, the pain is dull, so as, at first, scarcely to engage the attention of patients: they continue to walk, though with some difficulty; yet still they keep upon their feet, and sometimes persist in hard labour. This difference may arise from the nature of the parts bruised. I should imagine, that when the ligament is bruised, the pain and other symptoms are more violent, and that the contrary happens when the synovial glands have

have partaken of the injury. The complaint which is the consequence of this last accident, may be ranked in the class of chronic disorders. The glands tumefy, and sometimes secrete a synovia, which partaking of the distempered state of the organs that supply it, is not entirely absorbed, and may produce a dropsy of the joint, a partial ankylosis; or a luxation from relaxation^(t); or else this liquor degenerating, becomes acrimonious, destroys the cartilage lining the surface of the joint, and the head of the bone; the articular and capsular ligaments are corroded with caries, and in process of time, an abscess is formed externally, the opening of which serves only to hasten the death of those who are affected with it.

It may also be presumed, that the contusion of the cartilages themselves, and that of the bones, which may very possibly be the consequence of a violent shock in the joint, may sometimes be the cause of all the mischiefs within. Those cases, undoubtedly, in which the progress of the symptoms is very slow, afford us instances of similar contusions. The following fact seems to corroborate the preceding observations.

A woman, about eight and twenty years of age, laden with a basket full of bottles, having jumped down a few stairs in going into a cellar, preserved the center of gravity of the upper parts upon the left thigh and leg so well, that she kept herself from falling; but she experienced, in the inside of the joint of the hip, a violent shock, which was, however, attended only with a very bearable degree of pain, since she was able to continue her ordinary work for more than a fortnight, without complaining. But she still felt, in walking, a pain which gradually increased, from the continual exercise she was obliged to use in her capacity of servant: the difficulty of motion increased with the pain; and both the one and the other, three months after the accident, were grown so much worse, that the woman was no longer able to support herself upon that limb. At this period she came into the hospital where I attended; different embrocations were used to the upper part of the thigh, but without any effect; resolute, anodyne, and maturing cataplasms were then applied, because a tumour manifested itself at the upper posterior, and

external part of the thigh, which seemed tending to suppuration. A fever came on ; and when the abscess became evident, all the openings and counter-openings were made, which the sinusses the pus had formed, required ; the matter which came out, had no kind of offensive smell : it brought away along with it some small bony particles, and an oleaginous fluid floated on the surface ; the incisions were lengthened as much as it was thought necessary, setons were passed, and during the course of the treatment, vulnerary and deterfive injections were tried, such as were imagined to be best suited to the state of the parts. At different intervals, small portions of bone came away, separated either from the head of the thigh bone, or from the cavity of the joint, into which several of the sinusses penetrated. A slow fever, and a marasmus, which is its usual attendant, destroyed the patient, between three and four months after her admission into the hospital. Upon examining the seat of the disease, I found the capsular ligament almost destroyed, the round ligament totally consumed, the head of the thigh bone carious in all its surface, and even to a considerable depth in its center ; the cavity of the joint was also attacked with caries throughout its whole extent ; and lastly, its cartilaginous border was completely destroyed. The following is an instance of mischiefs nearly similar, produced by a fall upon the great trochanter.

A man about forty years of age, having slipped down upon the great trochanter, felt a sharp pain which obliged him to stay at home for a few days ; but the pain being relieved, he chose to return to his business, and walk about, which however he could not do without pain, or without some kind of difficulty, which he endeavoured to strive against for about a fortnight ; but the pain encreasing, he was obliged to take to his bed, and to apply for relief in the country where he was. All the means employed during three months, were ineffectual ; the upper, posterior, lateral, and external part of the thigh was much swoln ; and every motion attempted to be given to this extremity, was very painful to him. When he was brought into the hospital, it was soon perceived that there was matter formed in the vicinity of the joint ; so that the surgeon formed a very unfavourable prognostic of the case. Several instances having shewn

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him, that these diseases were incurable, in which ever way they were treated, he had almost resolved to leave this case to the efforts of nature alone. The fluctuation of the pus being, however, manifest, he determined to give vent to it by a suitable opening; the pus which came out at first, had no sort of bad smell, as in the preceding observation; but that which flowed at the subsequent dressings, was both great in quantity, and offensive; several sinusses led to the head of the thigh bone, and into the inside of the joint. The patient did not long survive this opening; the fever increased, the discharge became serous and very foetid, and he died three weeks after the operation. Upon examining the joint, the same mischiefs nearly were found as in the preceding observation; only the capsular ligament still existed entire, at the internal part of the thigh; but it was much thickened and inflamed there.

In 1762, a man, of forty-five years of age, having fallen upon his right knee, at the time that he was heavy laden, could neither rise up again, nor support himself upon his thigh. Being carried home, some means were tried for his relief, notwithstanding which, the pain, with the inability of walking, still subsisted. After he had kept his bed about a month, he began to walk with crutches; a swelling came on in the neighbourhood of the joint, which terminated in an abscess that burst of itself, about a year after, and left two fistulous openings, which gave vent to a greater or less quantity of matter; frequently these orifices were even closed, and only burst open again, when there was a certain quantity of the pus collected. Three years having elapsed in this state, without his having been able to make any use of his limb, he came to the Hospital, having at the upper and back part of the thigh, a very considerable collection of matter, which not finding an issue through the openings already mentioned, was let out by a simple puncture with a lancet, that the patient might, if possible, avoid the melancholy fate of those who had been treated in a contrary manner. The matter, which flowed in great quantity, brought away with it, several fragments of bone; and the new opening added to the former, another fistulous orifice, which favoured the habitual discharge of the matter. The patient survived

lived the operation ten months; and upon examining the part, the head of the thigh bone was found completely folded with its articular cavity; each of them presenting alternate asperities and cavities, which formed reciprocal indentations, as was evident, in separating this connection by force. I shall farther observe, in this respect, that the thigh bone was ankylosed at a right angle with the trunk; a circumstance which had undoubtedly proceeded from the situation of the patient, whose head and trunk had been always much raised. I could adduce several other instances of similar diseases of the joint of the thigh with the os innominatum, which had been the consequence of falls, either on the feet, or on the great trochanter, if these instances could give us any better information respecting the treatment necessary to be followed in such cases: the account of mischiefs that have been observed, is undoubtedly useful, inasmuch as it may suggest a rational and more certain plan of cure. But there is no need here of a greater number of facts, to determine the curative method to be pursued, in all circumstances analogous to those which I have just submitted to the consideration of the Academy.

When once we are acquainted with the mechanism of the counter-strokes which the inside of the cotyloide cavity may experience; when we know the direction of the motion which has been impressed on the parts by the body producing the shock, and can estimate nearly the quantity of this motion; and when we are conversant with the nature of the different parts which may be injured, contused, and squeezed by the shock; we are then able to determine, for the case that presents, a method of cure founded on rational principles. Besides, the accidents which the three patients have suffered, of whose disease I have given a succinct account, are fully sufficient to explain the curative indications to be pursued in all cases of a similar nature.

All the mischiefs consecutive to the counter-stroke in the joint, whenever it doth not produce fracture, can only proceed from the contusion and collision of the parts contained in it; but this collision and contusion can only give rise to a pain more or less acute, to a swelling and an in-

inflammation more or less considerable. The methods of cure to be employed in such circumstances, will be every thing that can alleviate the pain, and prevent the swelling and inflammation of the injured and bruised parts. Bleeding, rest, and a regimen, are very proper to fulfill this double indication ; but the bleeding must be repeated several times, and even at short intervals, if the pain should be violent. Rest must be absolute, that is to say, that all kind of motion of the thigh upon the trunk, or of the trunk upon the thigh, must be prohibited till the time for the coming on of the bad symptoms be past ; because however slight may be the friction of the contused and inflamed parts upon each other, it cannot but be extremely painful. With respect to the diet, that must be very strictly observed.

It is undoubtedly for want of having taken these precautions in the first period of counter-strokes in the joint of the thigh, that several patients have experienced that long series of accidents that has brought them to the grave. Nothing is therefore more essential than to recommend lying in bed to those who have received, by counter-stroke, violent shocks in the joint of the hip, and to confine the limb in such a manner, that the head of the bone shall not be able to play in its cavity, more especially when motion is extremely painful. This precaution, however, will not prevent us from having recourse to repeated bleedings, to a diet more or less rigid, and to resolute topics applied round the joint. Although we can have no great dependence upon these topics, on account of the depth of the parts on which they are to act, yet they are not to be neglected. Spirituous, resolute applications, for instance, may perhaps convey their effects farther than we suppose. It is by pursuing this kind of treatment, which is that of all well-informed practitioners, that I have seen many of these shocks, though violent, unattended with any serious consequence ; while others, which in the first instance seemed to require no attention, have produced the greatest mischiefs, for want of having taken the above-mentioned precautions in time. Rest, above all, is the first of remedies ; and we cannot be too attentive in fulfilling this curative indication.

Supposing

Supposing however, that these means of cure should not have been employed in time, or that they should have been ineffectual, and that, to the primary accidents of contusion in the hip joint, there should succeed an abscess in the cavity, with destruction of the ligaments, caries of the articular surfaces, &c., how are we to proceed in this case? Must the patient be left to his deplorable fate, and must art remain inactive under such circumstances? We should be almost tempted to answer in the affirmative, from what we have seen of the inefficacy of its efforts in several of these cases. Art here consists less in doing, than in avoiding to do what may be done; for a cure of this kind can only be the work of nature.

The instance we have given of the folding of the thigh-bone with the os innominatum, serves at least to shew us one of the resources which nature reserves to herself in desperate cases. Suppuration having once taken place in the inside of the joint, the soft and flexible parts which border it and maintain the bones in their situation, having been destroyed, nature hath no means of preservation left, but to form, by a complete ankylosis, one continued bone between the trunk and the thigh; and she tends to this end by the very mechanism, by which the destruction of the injured parts is effected. In consequence of inflammations and suppurations formed in the joints, the ligamentous parts are insensibly consumed, the bony and cartilaginous parts grow carious, and exfoliate in the same manner, and the fragments of them are drenched in the pus which is daily forming in the neighbouring parts attacked with suppuration. This pus, while it is not susceptible of spontaneous alteration, from the access of the air into the cavities where it is collected, is for the most part a mild and beneficial fluid, which, far from re-acting upon the bony and cartilaginous parts, takes charge, on the contrary, of their fragments, and serves as a vehicle to carry them out, after having, undoubtedly, contributed to detach them from the mass that supplied them.

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Now we know, that when the organic action of the vessels of the sound bone hath accomplished, either in one piece, or in detached portions, the exfoliation of the bony parts that were diseased, and that this exfoliation has been removed by art, or carried away by the powers of nature alone; we know, I say, that the sound bony texture remaining, endeavours to unite itself, either to the neighbouring flesh, the nature of which it hath almost adopted, or to other bony portions which may have undergone the same changes. It is therefore no way surprizing, according to the preceding observation, that the whole surface of the head of the thigh bone, and of the cavity which received it, having exfoliated by degrees, and the fragments of this exfoliation having been continually carried away by the discharge, these surfaces should have been soldered together, so as to make but one common bone. Would it have been more surprizing if this great effect had been accomplished without the destruction of the patient? Can we be certain that the patient, from his constitution, was in circumstances the most favourable for the success of the event? Can we be certain, in a word, that the operations of nature, as well as those of art, had not been counteracted by imprudent motions, as much during the three years that this man, who was very poor, languished at home, as during the ten months he lived in the Hospital?

Diseases of this nature do not therefore seem to me entirely beyond the reach of art. The long space of time the patient lived after the evacuation of the pus by the fistulous openings, compared to the time those patients lived, in whom large incisions were made to procure this evacuation, seems, in some measure, to indicate the proper mode of proceeding in such cases. From this instance, and others, which I cannot quote upon this occasion, because they have no connection with the question of counter-strokes, I should imagine, that when the original accidents have unfortunately failed of effectual relief, and that an abscess has been formed in the joint, which shall have manifested itself externally by evident signs; I should imagine, I say, that we should not be in haste to give vent to it; and if it should be thought indispensably necessary to let out the pus, this should only be done by puncture with a trocar. The pus,

in these cases, seems to be a kind of bath for the bone, to which it owes all the advantages we have been describing. So little should we consider the pus as a noxious fluid, that, in these instances, I have never found it tainted with the least smell, even when I have let it out after the collection had been formed several months, and in quantities so considerable as to amount to two or three pints, among which several fragments of bone have been found floating. But it is necessary to repeat, because it is an instructive observation, that in less than three days, when these abscesses have been largely opened, the matter, which at the time of opening was always of a proper consistence and perfectly devoid of smell, has become thin and very foetid. Perhaps by adopting the method I have proposed, with respect to the time and manner of opening these immense abscesses which are formed in consequence of violent contusions in the joint of the hip ⁽¹⁾, and by making the patient abstain from all motion which might impede the operations of nature and those of art, the complete ankylosis of the articulating surfaces might be obtained, which, in the desperate cases we are speaking of, is the only resource we have to look up to. To what has been said upon this subject, I shall add, that it would be proper to endeavour to put the lower extremity and the trunk in such a position with respect to each other, that after the formation of the ankylosis, the latter should preserve, as much as possible, a vertical direction with the limb.

SECTION

S E C T I O N II.

THE EFFECTS OF COUNTER-STROKES ON THE SEVERAL
PIECES THAT COMPOSE THE TRUNK, AND THE TREAT-
MENT PROPER FOR THEM.

WHAT has just been said of the mischiefs not unfrequently produced on the lower extremities by counter-strokes, leads us the more naturally to examine what may be the effect of counter-strokes on some parts of the trunk, inasmuch as these extremities themselves are the medium through which the shock is transmitted to those parts. It may, indeed, happen, that in falling upon the feet, the thigh bone may resist, and yet that some of the lower pieces of the trunk may receive a counter-stroke capable of being injurious to them. The os innominatum, the os sacrum, and the last of the lumbar vertebræ, are the parts that are most liable to this accident. If it be impossible that the os innominatum should be fractured over the head of the thigh bone, as it may be presumed, yet that bone may, at least, sometimes experience contusions in its cavity; but

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this accident is included in what I have said of the mischiefs that are done to the hip joint, when there is a violent counter-stroke felt in the cotyloide cavity of the os innominatum.

With respect to the os sacrum, though articulated by large lateral surfaces with the ossa innominata; and though firmly attached to these bones by intermediate cartilages, and by very strong ligaments, it is nevertheless liable to at least partial disjunctions, from the violent counter-strokes it sometimes suffers. We have too many instances of this to call the matter in question; besides that, it is sufficient to examine what happens in some falls on the feet, to be convinced of the possibility of a kind of disjunction of the os sacrum from the os innominatum. Let us suppose that in one of these falls the direction of the motion shall be such, as that none of the lower parts can have suffered either inflexion or fracture; in that case, all the momentum of the upper parts, multiplied by their weight, is spent upon the superior part of the os sacrum, which receives a most violent shock from above downwards, while the ossa innominata remain unmoved. The os sacrum is then driven like a wedge between these two bones; but the manner in which their articulating surfaces are constructed, the cartilage which lines them, the connections which unite these bones to the os sacrum, and the lateral pressure they then exert upon it, by means of the obliquity of the neck of the thigh-bone, are the reason that none but the most violent shocks can produce the kind of disjunction we are speaking of; which might however be effected by another mechanism, if nature had not provided against it. In the case we have been supposing, the sacrum, at the same time that it is driven as a wedge between the two ossa innominata, endeavours to make a swing forwards, while it is effectually opposed, not only by all the ligaments which connect it at its upper part to the neighbouring bones, but also by the sciatic, and ischio-sacro-sciatic ligaments, which acting upon the sacrum with a lever much longer than that of the power, on account of their attachment to almost all the lower extremity of this bone, are capable of opposing with greater force the swing forwards, which the shock, received at its upper part, tends to make it produce (*m*);
whence

whence we perceive how difficult it is, in the circumstance of very rapid motion of the trunk upon the lower extremities, that any mischiefs should be produced in the parts which concur in the union of the ossa innominata with the os sacrum, especially when both the extremities bear together.

But it may happen, that the shock shall be so violent, as to elude all the precautions taken by nature, and to produce, even in the case here supposed, if not a disjunction of the bones, at least a divulsion of the ligaments that connect them, a contusion of the cartilages, and of the bones themselves; injuries which almost always produce very serious complaints; or it may happen, that the motion of the trunk, being stopped by one of the extremities only, the force shall be spent entirely upon the articulating surface of the sacrum on one side, and that in the very disadvantageous circumstance of that bone being neither pressed upon laterally, nor supported by the opposite side. Even admitting in this case that the velocity of the upper parts, multiplied by their weight, should be reduced to a small matter when it came to be applied to the os sacrum; yet it would not be surprizing, that the parts which strengthen the articulation of this bone, on which the whole effort is spent, should suffer; at the instant of the shock, a very dangerous divulsion. All that has been said here, is nothing more than an anticipated explanation of the mechanism by which shocks, conveyed by a counter-stroke to these parts, have given rise to the mischiefs that have fallen under my notice.

A man of forty years of age, having climbed a tree, fell upon his lower extremities from the height of about fifteen feet, and at the instant of his fall, had no other sensation than that of a general commotion, accompanied with a sharp pain at the bottom of the spine. Being brought home, he would not submit to be blooded, and only took a few bottles of vulnerary infusions. The very next day, he went out; the little pain he felt, did not seem to him to merit any attention; he walked tolerably well for several days, and followed his business as usual. But about the thirtieth day from his fall, he began to grow lame; still however he felt

nothing more than a dull pain about the region of the os sacrum, towards the right side; the pain increased, and on the fifty fifth day the difficulty of walking was so considerable, that he could not do it without a stick; urged by his complaint, which now began to make him uneasy, he applied for assistance. Having a slight degree of fever, he was bled; rest, and the use of resolute fomentations, were prescribed to him; and lastly, embrocations made with the martiatum and oil of nutmegs, animated with salt ammoniac; but this was without any success, the period of the efficacy of these means being passed. The complaint continued increasing for five months, at the expiration of which, the patient could not bear in the least upon the right limb; the motion of bending the thigh upon the trunk was both extremely painful and difficult; and a tumour began to manifest itself, which came from under Poupart's ligament. Such was the state of the patient when he came to the hospital for relief.

The history of his disease left us no room to doubt of the nature of it, and unfortunately it afforded but a very melancholy prognostic. Suppurating cataplasms were applied to the incipient tumour, which, during the space of three weeks, increased but little. He was then seized with vomitings and hiccoughs, as if he had had a strangulated rupture. The tumour being somewhat lengthened towards the inside of the thigh, and there being no doubt of its containing matter, it was opened a few days after; a large quantity of white inodorous pus was evacuated; the patient was then free from fever; he was dressed with dry lint, and afterwards with digestive. The pus, which had been at first white, and devoid of smell, having become thin and very offensive, vulnerary, deterfive and spirituous lotions, were injected into the abscess; and the dressings and injections were more frequently repeated; but all these precautions were fruitless, the fever increased with the putrefaction, and the patient died on the ninth day after the opening.

Upon examining the body, all the upper and lateral portion of the sacrum on the right side was found carious, as well as the corresponding
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part of the os innominatum. There was an evident separation between these two bones, and the whole of the sacro-iliac symphysis was attacked with caries. The last of the lumbar vertebræ was also carious at its lower part, and the suppuration had in great measure destroyed the psoas and iliacus internus muscles. These mischiefs were probably the result of the divulsion, which the parts, destined to strengthen the union of the os sacrum with the os innominatum on the right side, had experienced, at the instant of the fall⁽ⁿ⁾; and this divulsion must undoubtedly have been produced according to the mechanism above mentioned. With respect to the symptoms that succeeded, they are the necessary consequences of the dull inflammation of these parts, and of the subsequent suppuration, and they might possibly have been prevented, if suitable means of relief had been timely administered.

A woman accidentally jumped down a few steps, a short time after having been delivered. At the time, she felt nothing more than a trifling pain in the region of the loins, which some days after grew worse, and was accompanied with a difficulty of walking, which increased gradually till she could no longer support herself upon the left leg. The pain she suffered, though not very violent, was continual; and all these accidents were attributed to an overflow of the milk, the more readily, as the upper part of the thigh and the hip on that side began to increase in size. This woman, who had not been carefully attended to in the beginning, was brought to the hospital, after having kept her bed upwards of three months at home; and at that time, a very large abscess appeared to be forming at the back part of the buttock, the matter of which had made numberless sinusses, which proceeded from the pelvis by the ischiatic notch. This abscess having been properly opened, furnished a large quantity of pus of tolerably good quality, and devoid of smell; it soon however became thin, of a brown colour, and very foetid; the fever, which had been more or less considerable during the disease, increased; a delirium came on, and the patient lived only eight days after the opening had been made. The examination of the body presented the sacrum, and the os innominatum on the left side, carious throughout the whole
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of their correspondent articulating surfaces; and in prosecuting our researches, we found the upper part of the sacrum likewise attacked with caries, as well as the last of the lumbar vertebræ.

The nature of the cause, and the circumstance in which the woman was at the time she received the shock, together with the accidents she experienced in the sequel, every thing announces, that there was a kind of disjunction or divulsion of the sacro-iliac symphysis (*e*). The two preceding observations would properly come in support of the possibility of this disjunction from an external cause, if even it had not been evidently demonstrated by a fact, in the case of a man named Binai, of which M. Louis hath given an account, in his history of the Royal Academy of Surgery (*p*).

From what has been said, it is apparent, that in the case of a fall upon the lower extremities, when the motion is suddenly stopped, there must be many circumstances united to occasion such a counter-stroke as shall be capable of accomplishing the disjunction of the sacrum from the ossa innominata, or only a certain divulsion of the medium that connects them. But without a shock so violent as is necessary to produce such mischiefs, counter-strokes may occasion, in the neighbouring parts, injuries entirely as dangerous as those, the unfortunate issue of which I have been mentioning. In a fall upon the two feet, which may have happened without fracture of any of the pieces that compose the lower extremities, without contusion of the joints that are found in them, and even without any apparent divulsion of the sacro-iliac symphysis; it occurs but too frequently, that the whole effort of the counter-stroke bears upon the basis of the os sacrum, and upon the last of the lumbar vertebræ. In the fall upon the feet or upon the buttocks, for instance, it is very possible, that the motion of the upper parts upon the basis of the sacrum, should be so rapid, that this basis, the last vertebræ of the loins, and even the strong and almost bony cartilage which unites these two bones, shall experience a degree of pressure, sufficient to disturb their organization, and their internal texture; and consequently to give rise to subsequent

quent mischiefs of a very serious nature ⁽⁹⁾. This assertion is not made without foundation ; for I have found, that many of those disorders which are called abscesses of the psoas muscles, might with propriety be ascribed to the violent pressure of the last of the lumbar vertebræ upon the sacrum, &c. There is the greater reason to imagine this, because, in these kinds of abscesses, the fourth and fifth of the lumbar vertebræ are sometimes carious to a considerable depth, as well as the anterior and upper part of the sacrum ; this is at least what I have observed in the bodies of several persons who have died in consequence of such abscesses. The following fact, which I have selected from among many others of the same nature that I have noticed, seems at least to confirm my conjectures upon this point.

A strong and vigorous man, forty two years of age, having leapt, in August 1765, from about eight feet high, felt at first, nothing more than a pain of a very doubtful nature, in the region of the loins. This pain was even dissipated a little while after ; but it soon returned, and continued, though in a very moderate degree, upwards of a month. At the end of September, the pain increased by very perceptible degrees ; and was much more considerable, particularly when the patient was coming down stairs. The primary cause of his complaint having escaped his memory, he conceived it to be the rheumatism ; but time, and the proper means of alleviating his pains, having proved ineffectual, he began to be uneasy. His disorder now grew worse every day ; a difficulty, and afterwards an impossibility of walking, came on ; and in February, 1766, a collection of matter began to shew itself at the anterior, internal, and upper part of the thigh. This abscess was opened in March, and in a short time the patient experienced the same fate as the other two persons, whose cases I have given an account of. The examination of the body, presented a caries of the upper and fore part of the sacrum, and of the bodies of the two last lumbar vertebræ. Does not the slow progress of the disease seem to announce, that the suppuration and partial destruction of the psoas, were, in this instance, only secondary effects of the suppuration and caries of the neighbouring bony parts ? These diseases may be alternately cause and effect ;

effect; and the caries of the sacrum, and of the lumbar vertebræ, may give rise to the psoas abscess, as collections of matter in the psoas muscle may occasion a caries of the spongy bones that are near it.

I shall also observe, that a palsy of the lower extremities may sometimes be one of the effects resulting from counter-strokes upon the last of the lumbar vertebræ; and that the debility which these extremities experience, is the result of a gradual compression which is then made upon the spinal marrow, and which is the consequence of the mischiefs going on, either in the cartilages, or in the bony substance of the vertebræ. Nothing can be more simple than this process; the violent shock which the parts have suffered, causing them to swell, they must necessarily diminish the diameter of the channel of the vertebræ, and consequently compress, in a greater or less degree, the spinal marrow. I have seen this happen to a young man of two-and-twenty, who, having fallen upon his buttocks, from the top of a shed, seemed at first to experience no remarkable accident, since he continued his work for at least three weeks after, at the end of which, he complained of the increase of a dull kind of pain that he had always felt at the bottom of the loins, from the instant of his fall: he still walked with tolerable ease; but this motion became more and more difficult: the lower extremities grew weaker by degrees, and at length totally lost their power of motion, without the patient having been sensible of any great pain. Being brought into the hospital, and questioned with respect to the cause of his palsy, it was concluded, that it would soon be followed by an abscess of the nature of those I have been speaking of. Accordingly, about six weeks after, a tumour appeared projecting from under Poupart's ligament; this being opened some time after, when it became prominent outwards, the patient soon paid the tribute to nature. Upon examining the body, the two last of the lumbar vertebræ were found affected with caries; which in one spot penetrated even into the channel of the spinal marrow, while the psoas and iliacus muscles seemed likewise, in this case, to have suffered only secondarily. Abscesses originally formed in these muscles, are not, however, unfrequent; and although they be only indirectly the result of a counter-stroke,

stroke, it may not, perhaps appear improper to explain, in this place, in what manner a fall or an effort may give rise to them.

In a false step, or a fall upon the feet, if the upper parts do not bear perpendicularly upon the sacrum, but if, on the contrary, they bear a little behind, the person then will fall backwards. To prevent this accident, the psoas and iliacus internus muscles, the fixed point of which is then at their attachment to the little trochanter, act, at the instant, with power and celerity upon the trunk, to concur in bringing back the line of gravity of the upper parts on the basis of the sacrum, upon the bones of the thigh; but the sudden effort of these muscles is sometimes so great, that many of its fibres may suffer a rupture, which may give rise to an inflammation, and an abscess in the substance of them, and afterwards to a caries of the neighbouring bones; a disease of so terrible a nature, that art hath as yet discovered no resource against it. I have had so little reason to be satisfied with the methods I have tried, or seen tried, in a number of these cases, that I can venture to affirm, that it is the best way to leave those who are afflicted with this disease to nature, particularly when they are arrived to a certain period. The abscesses which come forward, then burst of themselves; they leave small fistulous openings, and the patients may live, at least for a certain time; whereas they all perish in a few days, whenever these immense collections of matter are opened largely. It is for this reason I propose hereafter to open, only with a trocar, any abscesses of this kind that may come under my notice; for notwithstanding what MAUQUEST DE LA MOTTE hath said upon the subject, I have never seen one of them, the opening of which could have been reasonably attempted, by plunging a scalpel into the abdomen.

It is not when counter-strokes have given rise to these extreme mischiefs, of which I have been mentioning instances, that we can pretend to oppose their effects; the original accidents, are those which we must particularly attend to relieve. But in order to do this successfully, we must make ourselves well acquainted with the mechanism of the counter-

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stroke, we must be able nearly to estimate its power, we must know the nature and relative situation of the parts that have suffered; and from these preliminaries, we may form a proper judgement of the nature of the injury that has been produced at the instant of the shock. The method of cure then becomes rational, and leaves us no reason to apprehend those errors which are the consequence of empiricism and ignorance. With such principles, the proceedings we are to adopt in counter-strokes, the action of which bears upon the os sacrum, upon the sacro-iliac symphysis, and upon the lumbar vertebræ, are already traced out for us. The kind of mischief which such a cause may produce upon these parts, requires bleeding, more or less repeated, according to the violence of the symptoms; resolute and spirituous embrocations, a proper diet, and lastly, the most absolute rest. This cannot be too strongly recommended in disjunctions or divulsions of the sacro-iliac symphysis; and in this case, compresses dipt in resolute and spirituous topics, and supported by a circular bandage applied moderately light, and passing over the hip bones, are precautions by no means to be neglected. It is also necessary to have recourse to them in cases where the counter-stroke hath produced mischiefs among the lumbar vertebræ; but in this instance, the circular turns of the roller must be carried above the region of the loins; that part of the spine will be kept more steady by this precaution, and the bones which compose it will be less liable to be affected by motion, which is always hurtful in such circumstances. To these precautions we must add, that the horizontal position is the only proper one in these cases; but we must take little account of the number of days the patient is confined to his bed; it is better to carry our precautions too far, than to be deficient in them. So many unfortunate persons have been the victims of their own neglect in this particular, that the attention of practitioners cannot be too much fixed upon this point.

It is by the very simple means I propose, that after falls with counter-strokes on the os sacrum and the lumbar vertebræ, I have succeeded in relieving the first symptoms, which threatened subsequent mischiefs as alarming as those I have been mentioning: among several
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others, I have selected the following remarkable instance of this. A young man, having fallen from the height of about thirty feet upon his buttocks, felt a very great pain in the region of the os sacrum and of the loins. The second, third, and fourth lumbar vertebræ, made even an evident projection outwards, and besides the impossibility which the patient experienced of supporting himself upon his legs, they were attacked with a considerable numbness, and were deprived of their quickness of sensation. Repeated bleedings, a strict diet, graduated and very thick compresses applied upon the projecting vertebræ, and supported by the circular turns of a bandage rolled very tight round the body; the attention of keeping the patient upon his back, with his head low, and a pillow under his loins; were the means by which this accident was perfectly cured, in less than six weeks. But the patient was more strongly induced to maintain the position in which I had placed him, by the diminution of his pain upon being put into it. I observed also, in the first days after the accident, that the tighter the bandage was, the more he was relieved; for which reason, I ordered it to be frequently wetted with brandy, to prevent it from getting loose; and when the effect was not answered by this contrivance, I made the whole bandage tighter by applying a fresh roller. The patient, who found himself daily growing better, attempted to rise on the twenty-sixth day; but his pains in the lumbar region returning, I confined him to his bed for ten or twelve days longer; and when he got up again, I advised him not to walk at first without the help of a stick, and to wear a tight bandage round his body, in order, for some time, to give greater firmness to the spine. A fall of this kind might have occasioned a divulsion of the sacro-iliac symphysis, especially if this young man, in falling, had pitched only upon one buttock, and upon the tuberosity of the ischium on the same side.

Although frequent instances occur, of the lumbar vertebræ being much exposed to the effects of counter-strokes, yet they are not the only vertebræ that experience the pernicious effects of a similar cause; for it may act also upon the dorsal vertebræ, so as to produce very great subsequent

mischiefs. Lateral distortions of the spine, and its excessive projection outwards, have been often occasioned by a counter-stroke, the shock of which hath fallen upon these vertebræ: at least I have seen many deformed persons who had become so, only in consequence of falls they had been exposed to in their younger days. With respect to the method of cure to be pursued, it is almost entirely prophylactic; it is scarce of any utility, except in the first instance, and should be little different from that which is adapted to the complaints of which I have been giving the history. Bleeding, rest, and a circular bandage round the body, may be sufficient: it will be proper, however, in children, to add to these methods, the remedies calculated for the rickets, whenever there appears a tendency to this disease, which is itself often the only cause of these deformities. Absorbents, tonics, bitters, preparations of steel, and especially an abstinence from all acedent food, are then the most effectual remedies.

After having successively examined the effects of counter-strokes on the different bones which compose the pelvis, and the greatest part of the spine, it remains only, to complete this section, that I should trace these effects upon the other bones which concur in the formation of the trunk. Among these, the cervical vertebræ do not appear to me susceptible of the bad effects of counter-strokes; but this cannot be said either of the ribs or the sternum. That the ribs especially, may be fractured in a part distant from that which receives the shock, is a fact which stands in no need of being proved; fractures of the ribs, with projection outwards, are always the effect of a counter-stroke, to which their form renders them liable. The rib being stopped short, as it were, backwards, at the same time that it receives a considerable shock towards its anterior extremity, is fractured in the middle: this may also happen when the shock bears upon the cartilaginous part of the rib, or upon the sternum, provided the body that causes it, have some extent of surface, and shall strike with a certain velocity; but the mechanism of this fracture, and the treatment of it, are too well known for us to dwell upon. If the shock should bear upon the angular or middle part of the rib, even in the instance where the opposite side of the chest should lean against some resisting body,

body, no injury can be done to the sternum, nor to the anterior part of the ribs ; and then the fracture, which may happen at the part that receives the blow, is no longer the effect of a counter-stroke. It could only be classed among the effects of such a cause, in those instances, where it should happen on the side opposite to that which received the shock ; which is not impossible in the supposition of the trunk leaning against some resisting body ; and in this case likewise, the best way of directing the cure is sufficiently known. With respect to the sternum, although from its situation and figure it should not be very liable to the effects of counter-strokes, yet it hath sometimes happened, that a fracture of this bone has been produced by such a cause, of which the following fact is an instance.

A mason, eight and twenty years of age, having been brought to the hospital, after falling from the height of about fifty feet, it was found, upon examining him, that he had a fracture of the left thigh, and that the spinal processes, of the last of the dorsal, and first of the lumbar vertebræ, were likewise broken. The fracture of the thigh being reduced, and the surgeon perceiving that the man could not bring his head forwards, examined in order to find out the reason of this, and discovered it to be a transverse fracture of the sternum, with a considerable interval between the first and second piece of that bone. The patient when on the ground, was found lying upon his back, with his left leg under him ; and upon the fore-part of the breast there was neither ecchymosis nor excoriation, nor any mark which could induce a suspicion that the fracture of the sternum had been produced by a blow upon the part. The mechanism of this accident, appeared therefore so problematical to the surgeon, that he found it difficult to account for it ; but a workman who was present, soon enabled him to solve this difficulty, by acquainting him, that the patient, at little more than one third of the course of his fall, had met with a projecting piece of scaffolding, which had given him a blow in the middle of his back. The surgeon, as well versed in the practice as in the theory of his art, immediately concluded, that the fracture of the spinal processes of the vertebræ above mentioned, and
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that of the sternum, were the consequence of this first shock, because, in the instant that the body had been stopped in its fall by the middle of the back, the lower extremities on one hand, and the upper part of the trunk on the other, had preserved a sufficient quantity of motion to force the spine to such a degree of extension, that the muscles which go from the sternum to the head, &c., being violently stretched, had effected the separation of the first bone of the sternum from the second. This mechanism is too simple, not to be readily understood. With respect to the curative indications that presented themselves for this double accident, they were fulfilled by a method as easy as it was effectual; so true it is, that a man of genius always enriches the art, while he seems to simplify it. The enlightened practitioner of whom we are speaking, ordered a hollow to be made in the bed, at the part corresponding to the fracture of the vertebræ; he placed thick cushions under the nates, with a pillow under the shoulders, and employed every precaution necessary to keep the spine constantly bent forwards, and to bring the head in the same direction: this he accomplished by attending only to the position of the patient. The elongation of the spine, which is never more considerable than in the state of flexion, brought back, into their natural situation, the spinal processes, which were a little turned to one side, and maintained them there by means of the constant tension of the ligaments and muscles that are fixed into it. The upper portion of the sternum was kept, by the same contrivance, in exact opposition with the inferior extremity; so that at the usual period of the cure of fractures, the patient went out perfectly well, and without having suffered any symptoms, except such as are usual, and to remedy which, the proper methods had been employed immediately after the accident. I make no doubt but that many fractures of the sternum have been produced by the same kind of mechanism, and which, for want of being known at the time, have given rise to abscesses, and to troublesome caries of the bones.

SECTION

S E C T I O N III.

TO EXPLAIN THE EFFECTS OF COUNTER-STROKES
ON THE UPPER EXTREMITIES, AND THE MEANS OF
RELIEVING THEM.

ALTHOUGH the upper extremities, in cases of leaps or falls on the feet, do not receive the first shock, yet they partake of it, at least very often, in such a manner as to suffer material injuries. If a person should fall from any height upon the lower extremities, when these come to the ground, they have seldom the whole weight of the upper parts to support, because the line of gravity of the latter passing, for instance, along the fore part of the cotyloide cavity, the trunk and the head continue to fall forwards, and the hands present themselves naturally to the ground, to ward off the violent shock which the head might receive, without this precaution of mere instinct. It is not necessary even, to confirm this observation, that the fall should be from any height. If a man, in walking, doth but lose his balance, he falls; if backwards, he throws his elbows and shoulders as far back as possible, in order to multiply

tiply his points of contact with the ground; if forwards, he presents his hands and knees for the same purpose; and if sideways, the elbow. Thus it is that we instinctively avoid the commotion of the brain or the fracture of the cranium; but nature very frequently can only ward off these accidents, at the expence of the parts of less consequence, which seem so voluntarily to offer themselves for the preservation of this important viscus. Accordingly, we have already seen what the lower extremities are exposed to suffer, in many cases, in taking their share of this preservative intention (*c*); and it is in endeavouring to accomplish the same end, that we shall find the upper extremities also exposed to injuries which are almost always the effect of a counter-stroke.

If the palms of the hands strike upon the ground in any fall whatever, these parts being suddenly stopped, the body is stopped at the same time; and the bones which compose them receive the shock of the upper extremity, which is itself acted upon by part of the trunk in motion. This kind of shock, which is a real counter-stroke, may, and sometimes does, produce mischiefs in the joint, a divulsion of the ligaments which connect the neighbouring bones, or a dislocation of the wrist; which last accident belongs to the effects of counter-strokes taken in the most extensive sense. It may however be observed, that some of these injuries are less frequent than they might be supposed to be, and that for reasons which are derived from the mechanism of the fall. The direction of the motion being then in a midway between the vertical and the horizontal line, the bones of the carpus are always pushed directly against the bones of the fore arm, and this same direction farther eludes the violence of the shock, inasmuch as the hands being able to slide on a little forwards, the motion is not so suddenly stopped as it would have been without this circumstance. But notwithstanding this, and the loose attachment of the scapula, which renders the application of the weight of the trunk gradual, a fall upon the hands will not unfrequently occasion, in the joint of the wrist, the injuries I have been mentioning.

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The principal symptoms that characterise these injuries, are an acute pain, and a swelling, more or less considerable, with a difficulty of moving the part. If these original accidents be not relieved, an abscess, a caries, a complete or partial ankylosis, may succeed; at least I have seen instances of some of these terminations. The symptoms that first make their appearance, sufficiently indicate the kind of remedies to which we must have recourse; repeated bleedings, resolutive topics, more or less spirituous; in certain cases, emollients, and anodines in others; retentive bandages calculated to prevent every motion of the part; are the only means to be employed in the first instance. But when the primary symptoms are relieved, balsamic embrocations may be tried, such as those made with the *balsamum tranquillum*, the *martiatum*, and the oil of nutmegs animated with a little volatile spirit of salt ammoniac; or we may use the soap of lead, quickened also with the spirit above mentioned. I have employed this last with success, in stiffnesses of the joints, with enlargement. I have seen some complete and true ankyloses, and two incomplete or spurious ones, in consequence of counter-strokes received in the joint we are speaking of (¹), which have all happened to persons who had neglected to apply in time for proper relief.

But the effects of these counter-strokes are not confined to the wrist, they most commonly produce a fracture of the fore arm; and whether this fracture be simple or compound, it requires no other method of treatment than such as is well known. It must only be observed, that as the bones are at some little distance from each other, it is necessary, before the circular roller be applied, to place two slips of linen of tolerable thickness, so as to answer to the inter-osseous space, one on the out, the other on the inside. This precaution is more particularly necessary when the fracture is in the middle of the fore arm, and if it be near the elbow joint, care must be taken not to put the arm in a sling; it must, on the contrary, be kept extended, for reasons which are very evident.

If instead of falling upon the hand, the person falls upon his elbow, and that the olecranon be not fractured, the inside of the joint may experience a counter-stroke accompanied with symptoms more or less violent, and which may be attended with all those fatal consequences which I have mentioned in describing the effects of counter-strokes in the joints of the lower extremities.

In November 1768, I opened, in a young man of eighteen years of age, an abscess, the origin of which was in the elbow joint, and which had proceeded from a similar cause. The patient had felt great pain at the instant of his fall; a considerable swelling had come on; and when I saw him, on the 17th day after the accident, he had a considerable degree of fever; it was in vain that I bled him twice, and applied anodine and emollient resolute topics to the tumour; it terminated in suppuration, and the fluctuation becoming evident a few days after, I delayed not the opening of it. The pus being mixed with a glairy fluid, and the introduction of my finger into the opening, ascertained the seat of the disease. The patient seemed relieved for some days after the operation; but the bad symptoms soon returned, the fever increased, the discharge became foetid; the edges of the wound were livid and much swelled; the patient was delirious; and during the space nearly of three weeks, he seemed to be in too desperate a situation for us even to be able to attempt amputation with any prospect of success. After this period, however, he grew better by degrees; the symptoms were relieved, and the wound being dressed with dry lint, was perfectly healed, without there having been any apparent exfoliation; there were even hopes, when the patient went out of the hospital, that the joint would still retain a certain freedom of motion.

It seldom happens that mischiefs are produced in the joints, unless in those cases where the shock is not considerable enough to occasion a fracture; but let us suppose, that in a fall upon the elbow, the shock should be sufficient to produce a solution of continuity in the bone; it will either be the olecranon, or the upper part of the fore arm, which will yield to
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the immediate application of the force upon them; or else these parts will resist, and the os brachii will be fractured by a counter-stroke, as it frequently happens. The os brachii will either be broken in its body, and then the curative intentions are too well known to be mentioned here, or else this bone may be fractured at its upper extremity, or its neck, and in that case we must take such precautions as the seat of the fracture requires. Though the curative indications be the same as in all other fractures, yet the mode of fulfilling them is different. As it is impossible to surround the fractured part with a circular roller, after having put the bones into a proper situation, we must apply under the upper part of the arm, two thin compresses which must cross each other on the fore part of the shoulder, while the axilla and the inside of the arm must be defended with tow or lint, previously steeped, as well as the above-mentioned compresses, in a mixture of oil of roses, the yolks of eggs, and brandy^(u). The arm must afterwards be brought close to the trunk, while any hollows there may be between the arm and the trunk, either at the fore or the back part, must be filled up with lint or tow, which is also to be put round the upper part of the arm and the shoulder, and the arm is then to be kept in the situation in which it has been placed, by the circular turns of a roller passed round the body and including the arm, and by a bandage somewhat similar to the capeline for the clavicle, taking care only that the roller should be long enough to make a sufficient number of turns round the body. The arm being thus immoveably fixed to the trunk, and the fore arm put in a sling, nothing can prevent the re-union of the fractured pieces. It is by this very simple method, which is similar to that of M. MOSCATE, that I have cured several fractures of the neck of the os brachii without the least accident. The padding recommended by that able practitioner, is very well calculated to answer the surgeon's intentions in this case: and we may have recourse to it, if we think proper, in preference to any other mode^(w).

But the shock transmitted from the elbow to the os brachii, may leave that bone entire, and make use of it merely as a medium, by which the mischief is conveyed to a greater distance. Thus it is that a fracture of

the processus acromion of the scapula, is sometimes produced: the following is an instance of it. In 1769, a man carrying a considerable load upon his left shoulder, having fallen upon the right elbow, or rather upon the upper part of the fore arm, while bent at right angles with the upper arm; the head of the os brachii was driven with so much force against the acromion, that the process was fractured, while I perceived only a slight contusion at the part which had received the shock. It does not appear to me, that the mechanism of such a fracture ought to make any alteration in the method of cure which it requires of itself. In whatever manner the cause producing the fracture may have acted, the business is to bring the fractured extremities into exact apposition, and to maintain them in a state of rest, which may allow of the inspissation of the intermediate juice that is to unite them.

This double intention may be fulfilled, by keeping the arm exactly fixed to the trunk, and supporting it in such a manner, that the head of the os brachii shall be constantly kept close to the acromion, the motion of which is afterwards to be restrained, as well as that of the scapula and clavicle, by suitable compresses, and by the capeline of the scapula, which is to be applied, as I have just before mentioned, so as to include the arm in the circular turns which this bandage makes round the body; the cure will be the more complete in proportion as the motion of all these parts shall have been more confined. For this reason, in order more effectually to answer this essential indication, we must fill up, with lint or cotton dipt in the mixture above mentioned, all the hollows on the fore part of the arm, above and below the clavicle, &c. and this before we apply the roller. These were nearly the modes of proceeding I adopted in the case just mentioned, and which succeeded so well, that the patient enjoyed, a few months after, a greater freedom of motion than I expected, considering what authors have said of this fracture.

But supposing that the direction of a violent shock should be such, that the os brachii shall not suffer any fracture either in its body, or at its neck, and that it shall not be driven against the acromion, the shock is
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then conveyed almost entirely to the inside of the joint, where it may produce accidents proportioned to its violence. An acute pain, a swelling more or less considerable, with inflammation, subsequent abscesses, and a caries of the bones, are sometimes the effect of such a shock. In July 1765, a man fell from a horse, and pitched upon his right shoulder; the pain, which was at first rather acute, was relieved by two bleedings, and by resolute applications; but it was not completely removed; some particular motions were always painful, and the pain increased upon change of weather; this the patient attributed to the rheumatism, to which he had been subject for many years, and which he imagined to be fixed upon this part. Eight months having elapsed in this situation, he was seized in March 1766, with a high fever, for which he was bled four times. A week afterwards, the fever having still continued with violence, he felt in the right shoulder, a pain more considerable than usual, with a difficulty of motion which he had not yet experienced, and a tumour appeared, which was considered as the crisis of the disease. The swelling grew larger, and the pain, which increased notwithstanding the application of anodines, did not seem to give way, till it might be presumed that a suppuration was formed. The collection of matter not being, however, evident to the touch, anodine and suppurating topics were still continued for more than three weeks. The fluctuation being then apparent, an abscess was opened on the lateral, outward, and upper part of the arm, which furnished a very great quantity of well-conditioned pus. It was thought that the patient was saved by this evacuation, because this was supposed to be only a critical abscess; but we were soon undeceived; the fever did not give way, the abscess still furnished a great quantity of matter, and some small particles of bone were found at intervals in the discharge. This unfortunate discovery rendered the nature of the malady no longer doubtful, any more than the imminent danger in which the patient was; notwithstanding all the care that could be taken of him, he fell into a hectic, which increased by degrees, and destroyed him in three months after the opening of the abscess. Upon examining the shoulder joint, I found the head of the os brachii, and that of the scapula, affected with a deep caries.

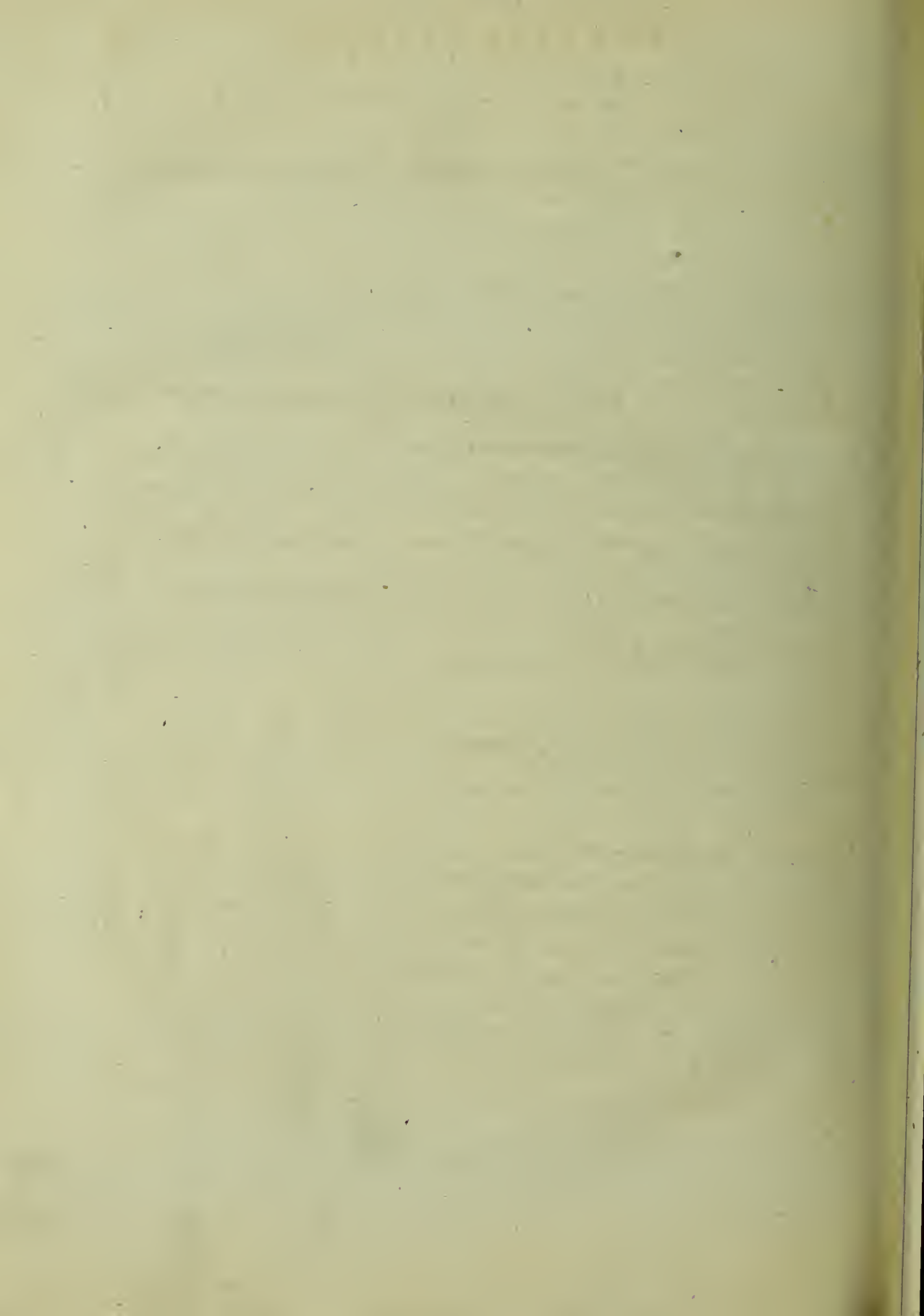
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Might I be allowed to hazard some conjectures upon this disease, I should say, it is to be presumed, that the fever which came on, was independent of the effects of the shock on the joint, seeing that it preceded, several days, the pain and the swelling of the part (*); but it may also be imagined, that without the previous mischiefs in the joint, the fever would not have occasioned those appearances which I observed after the death of the patient. Still it is certain, that in the first instance, we cannot carry too far the precautions which ought to be taken after violent shocks in the joints: it is right to recal to our memory, and to that of others, that in these cases, we are not to suffer patients to remain in that state of confident security, which they derive from being assured, that they have neither a dislocation nor a fracture.

In continuing to trace the effects of counter-strokes upon the bones that compose the upper extremities, we find, that the last of the pieces that concur in this structure, in ascending from below upwards, is as much, and even more, exposed to them than any other; this is so certain, that there are very few fractures of the clavicle that are the consequence of an immediate stroke upon this bone; sometimes it is occasioned by a fall on the elbow; sometimes by a fall or a blow on the shoulder, or on the scapula. I have seen several instances of fractures of the clavicle, that have happened in all these different ways. The mechanism of them is so simple, that it is unnecessary to explain it. Neither shall I give an account of any of the cases, because they would contain nothing but trivial observations, little calculated to appear before the respectable body who are my judges; nor shall I mention any thing of the mode of cure, which is sufficiently known, and requires, besides, no alteration respecting the cause producing the fracture: I shall only recommend Mr. BRASDOR's bandage, as preferable to every other method of keeping the shoulders constantly back.

We shall conclude this section by observing, that if it be sufficient, in order to class any injury among the effects of counter-strokes, that it should have taken place in a part distant from that which received the stroke,

stroke, the effects of counter-strokes on the external parts will be considerably increased; for in this general acceptation, dislocations are always produced by this cause. We cannot doubt of this, when we see that a dislocation of the thigh is almost always the result of a shock, of a resistance, or of a power applied towards the lower extremity of that bone; the same may be said of a luxation of the wrist, of the elbow, of the shoulder, of the clavicle, of the lower jaw, of the leg, &c. The bone always receives the stroke either at the extremity opposite to that which is dislocated, or in its body: there are even few instances where the shock applied immediately to the joint, could possibly produce the kinds of accidents we have been speaking of^(y). In making this observation, I do not mean to explain the mechanism by which dislocations are produced; this is a point which it was impossible ever to mistake; we only give the name of counter-stroke to this mechanism, without making any addition to the well-known theory of these accidents; nor does this bring any improvement in the mode of treatment required for luxations. It is well known what proceedings are to be adopted in all cases of this kind, either to accomplish the reduction of the dislocation, to maintain the parts reduced in their situation, or to relieve the present and counteract future mischiefs. All these points of doctrine have been discussed by the most able practitioners; and I cannot suppose it to be the wish of the Academy that we should take a review of all kinds of luxations, because they are effects of counter-strokes, if even we had any interesting observations to offer upon some of these injuries. What is here said of dislocations, I also say of a wrench, and of a diastasis, which are likewise the effect of counter-strokes, since the mischief is not done to the part that receives the stroke. With respect to the treatment of these complaints, we have nothing to propose which is not already known. Repeated bleedings, resolute, emollient, and sometimes spirituous applications, retentive bandages, and above all things, absolute rest, are the means to be preferred in all such cases; and I only mention them here, that I may not be supposed to have overlooked this part of the effects of counter-strokes.



P A R T II.

TO EXPLAIN THE EFFECTS OF COUNTER-STROKES UPON THE SEVERAL VISCERA CONTAINED IN THE CAVITIES OF THE HUMAN BODY, EXCLUSIVE OF THE CRANIUM; AND TO POINT OUT THE TREATMENT THAT MIGHT BE EMPLOYED MOST SUCCESSFULLY AGAINST THE MISCHIEFS THAT ARE PRODUCED BY THEM.

DAILY experience too evidently proves, that very serious accidents are often the effect of a commotion, or violent concussion, which the principal viscera of the human body experience, after a shock given to a part which is often at a great distance from the cavity containing these viscera. This kind of injury is not confined to that vitcus only which is placed within the cranium. The viicera that are inclosed within the thorax and the abdomen, are also exposed to it, although most of the precautions taken by nature to avoid the too great commotion which the brain might experience in cases of leaps, or falls, are common to the other viscera. We shall, however, observe, and indeed it cannot be

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otherwise, that in the most ordinary instances of falls, the viscera of the thorax are less exposed to the effects of counter-strokes, than those which are contained in the pelvis. This is the consequence, both of the multiplicity of parts, calculated to absorb motion, which are found between the feet and the chest, and of the power which the chest has of being extended still farther downwards, when the motion of the pelvis is already stopped. In this, as in the first part, we find the division ready marked out, and we adopt it the more willingly, as it is very natural, and well calculated completely to illustrate the last part of the question we have to treat of. We shall therefore begin by explaining the effects of counter-strokes upon the viscera contained in the abdomen, and shall conclude this essay by examining these effects upon the organs inclosed in the cavity of the chest.

SECTION

S E C T I O N I.

TO EXPLAIN THE EFFECTS OF COUNTER-STROKES UPON THE SEVERAL VISCERA CONTAINED IN THE CAVITY OF THE ABDOMEN, AND TO POINT OUT THE MODÈS OF CURE BEST ADAPTED TO RESIST THEIR CONSEQUENCES.

IT is sufficiently evident, that the sudden stoppage of motion of the pelvis, in instances of falls or leaps, must give rise to a shock, or commotion in the viscera of the abdomen, so much the more violent, as the shock shall have been greater, and as the several bony pieces, by means of which the shock is transmitted, shall have escaped being fractured; it is the same as in a concussion of the brain, which is never more considerable after a violent shock, than where there is no fracture in the bones of the cranium.

It must, however, be acknowledged, that the shocks which the viscera of the abdomen may experience, in case of leaps, falls &c. scarcely produce any mischief in them, except when these viscera are in an unnatural,

natural, or at least, not an ordinary state. At any rate, the injuries they may be exposed to in these instances themselves, are always the effect of counter-strokes, taken in the most extensive sense. Thus it is, that abortion and its consequences may be considered as the effect of such a cause. The most trifling fall, or a false step, are sometimes sufficient to produce it, because, in these circumstances, the motion of the pelvis being already stopped, while the placenta, fixed to the uterus, still tends to move downwards with the velocity acquired by the fall, an effort is made upon that part of the womb to which it is fixed, which would separate it much more frequently than we observe this to happen, if it experienced any resistance from the womb, or if the uterus had not nearly the same tendency downwards as that spongy body has. But this circumstance, so favourable in preventing its separation in ordinary and habitual motions, becomes insufficient when the pelvis suffers shocks of any violence: the divulsion of the placenta becomes then almost a necessary consequence, notwithstanding the power which the fundus of the uterus has to follow its motion downwards, and notwithstanding the presence of the waters, which take off so considerably from the weight of the placenta itself. We know in what manner the separation of this organ, when begun in one spot, extends itself by means of the fluid, which issuing from the small ruptured fibres, is extravasated between the placenta and the sides of the uterus; we know how the flux of the blood is brought on, and lastly, how the pains which come on, give rise to premature labour. With respect to the proper means of preventing this alarming accident, every surgeon is acquainted with them. Bleeding, rest, and diet, are the remedies best adapted to the complaint, and they sometimes succeed; the most complete rest especially, is absolutely necessary. This is at least all that can be done by art, under such circumstances. It is by the same mechanism, that a fall, upon the feet, or upon the knees, a leap, &c. may produce a recent hernia, or force down an old one, and thus become the distant cause of all the mischiefs that may ensue. It is by the same mechanism that a schirrous testicle, which is not supported by a suspensory, in the shocks which are the consequence of the fall, may occasion a dragging down of the cord, and excite a pain in it which may be communicated to the testicle

ricle itself, and occasion the schirrus to degenerate into a cancer. Thus it is too, that a counter-stroke, taken in the most extensive sense, may occasion pain in a womb that is swelled and inclined to become scirrhus, which may change the nature of this termination into a worse. Even in instances where this viscus is not in a diseased state, it may give rise to hæmorrhages very difficult of cure. Are we not also to consider as the result of the kind of cause, the effects of which we are investigating, to those pains, which, after a fall, were felt in the abdomen of a woman, who, for some years past, had had a schirrus of one of the ovaries; and must we not attribute to the same cause, the fatal alteration which happened, after a similar event, in a tumour of the same sort in the liver? I have seen all these fatal accidents be the result of imprudent leaps, or of falls upon the lower extremities, or the bones of the pelvis.

It is not, however, always necessary, that the effects of counter-strokes should fall on diseased viscera, in order to give rise to disorders which were not previously existing there. I have seen a man who before enjoyed a good state of health, void almost pure blood through the urethra for several days together, and this on account of having fallen astride, from almost the height of two feet, upon a bar of iron. From that time he has always been subject to nephritic colics, and to a frequency of voiding his urine, attended with an habitual discharge of small gravel; disorders to which he was entire stranger before his fall. From whence did this blood proceed; from the bladder, or from the kidneys? In what manner has this counter-stroke been able to produce a hæmorrhage in the urinary channels, and give rise to those habitual nephritic colics which torment the patient? These are questions, the solution of which would be as useful as satisfactory; but I am far from pretending to solve them. It appears to me, however, from the pain which the patient told me he plainly felt at the instant of his fall, about the region of the loins, and from the dull pain which he complains of ever since in that part, that the kidneys may be considered as those of the urinary organs which suffered most by the commotion. The branches of the renal plexus of nerves being vio-
lently

lently affected at the instant of the shock, may have injured the vascular system so much, as to occasion a hæmorrhage in the internal structure of the organ; or else these nerves might, perhaps, leave the secretory canals in such a state of atony, that in the first instant of the accident the blood might pass into them indiscriminately with the aqueous fluid that was to be secreted in the kidney; and indeed, such a disturbance in the internal organization of this viscus was very likely to encourage the formation of those gravelly concretions which the patient voids with his urine ever since that period. This is now eight months ago, during which time the patient hath been in the habit of taking a quantity of the decoction of marsh-mallows and linseed; a drink which may possibly have contributed to keep up his tendency to a nephritic colic. The good effects he finds from saponaceous and balsamic astringent remedies, the use of which he has continued for some days past, would seem to confirm my conjectures.

The following case affords also a very striking instance of the effect of counter-strokes, which, though trifling, yet from being often repeated, have given rise to fatal disorders. A tradesman, little accustomed to go on horse-back, having rid six and thirty miles at full trot, upon a bad hackney horse, found himself overcome with fatigue. On his return, he vomited, and was seized with a pain in the epigastric region, which he thought rest would remove. It continued, however, with a degree of violence for some days, during which time, he would not submit to lose blood, although he had some fever, and vomited whenever he took any solid food; nor did he even observe the absolute rest that had been enjoined to him. The pain being somewhat abated, and the vomitings returning at intervals only, he took little notice of his complaint for some time; but the pain still subsisting, and the vomitings having never left him entirely, he began to grow uneasy, and had recourse to remedies which were not well adapted to his case; an emetic was administered to him twice; and he was ordered to take wormwood wine. The complaint, far from diminishing, increased; the vomitings became more frequent; and after having lived two years, trying a variety of medicines, the patient
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was reduced to such a state, that his stomach would retain nothing but liquids; and these he at length became unable to pass, for they were thrown up again in large quantities, after having remained sometimes two or three days in the stomach. The patient fell at length into a marasmus, and died in an astonishing state of emaciation. Upon opening the body, I found the liver very hard, without being much increased in size; the pancreas was schirrhous at that part of it which is next to the duodenum; and this intestine, partaking of the disease of the pancreas, was almost entirely obliterated; the stomach was exceedingly large, and the intestines were scarce bigger than those of a chicken.

Besides all the pernicious effects of counter-strokes upon the principal viscera of the abdomen, how frequently has not this kind of cause given rise to a mortal commotion in the spinal marrow? There are few practitioners who cannot produce some instance of a palsy in the lower extremities, coming on in consequence of a fall, without either dislocation or fracture of the lumbar vertebræ. A girl of seven years of age, walking in a waxed room, having fallen backwards, was unable to rise again. Being lifted up and put to bed, she was examined; and although none of the bones that compose the spine were found injured or displaced, yet the lower extremities had lost all power of motion. The father having refused to suffer his child to be bled in the first instance, the parts were only rubbed with warm cloths, and fumigated with various aromatics, while vulnerary remedies were internally administered. Notwithstanding these assistances, and bleeding, which was afterwards performed, the parts never recovered their power of motion; and the girl lived only between two and three months after the fall. We could not obtain leave to open the body; but it is very certain, that there was no appearance externally, which indicated any kind of injury done to the bones.

With respect to the proper mode of treatment in the several cases which we have been speaking of, it may be observed, that the symptoms which are or may be the result of counter-strokes, the effects of which
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are felt either in the principal viscera of the abdomen, or in the lower part of the spinal marrow, seem to indicate, that the curative intentions to be pursued, must be nearly the same, whatever may be the nature of the parts suffering the mischief. Accordingly, in the several instances we have been mentioning, bleeding, rest, and strict diet, are the chief remedies to be employed.

SECTION

S E C T I O N II.

TO EXPLAIN THE EFFECTS OF COUNTER-STROKES ON THE
VISCERA CONTAINED IN THE CAVITY OF THE CHEST, AND
THE MODE OF TREATING THEM.

ALTHOUGH, in cases of leaps, and falls upon the feet, or on the nates, the effects of counter-strokes, for the reasons before mentioned, can seldom be conveyed to the viscera contained in the cavity of the thorax, so as to disturb the functions of these viscera; it is not however an uncommon thing to find, that the kind of motion communicated to the chest in this way, produces evident mischief in the lungs; but it must be acknowledged, that this happens more particularly, when there is some disease in this organ. Accordingly, it may readily be conceived, that if the lungs be affected with tubercles, if they be partly schirrous, or have recently contracted adhesions in consequence of inflammation, the commotion they would experience, in case of any fall, might give occasion to dangerous divulsions, to rupture of vessels, and to an hæmoptoe. Thus it is that I have seen the mere shaking of a horse, hasten the death of persons

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sons whose lungs were much affected with tubercles. It must not, however, be imagined, that the lungs, though free from the diseased state above-mentioned, should still be entirely sheltered from the effects of counter-strokes in cases of leaps or falls upon the lower extremities. I have seen persons, without any tendency to disorder in the lungs, seized with a spitting of blood, after such falls, and incur all the dangers of an hæmoptoe. I have known others complain of a painful dragging sensation between the two shoulders, at the place where the lungs are more particularly attached to the spinal column; which was certainly owing to a divulsion of the connections that fix this rather weighty viscus to that part. I have also seen instances of persons, who having fallen upon their heels, from the height of about two or three feet only, have been seized with fainting fits to an extreme degree. This symptom may possibly be considered as the effect of a violent commotion, which the heart may have experienced at the time of the shock. I am, however, more inclined to think, that these faintings, among which I have seen an instance of their returning for three weeks together, every time that the trunk was thrown into a vertical position, are the effect of a concussion of the brain, a disease which is not the object of our present enquiry; but the viscera of the thorax may experience injurious concussions, by other means beside that of a fall on the feet, or a leap from a certain height. Every blow received externally upon the parts which form the cavity, may occasion considerable injuries in these viscera, even when the bony compages that surrounds them, shall remain unhurt. In this case, the heart cannot always avoid the effects of such counter-strokes. We know the kinds of mischief which may happen, by this way, to these important viscera, and the curative means to be employed against them; the same may be said of the contusion which the liver may receive from a violent blow on the false ribs. Repeated bleedings, a strict diet, diluting liquors, and resolute spirituous applications, are almost the only remedies to be used in these cases. I have undoubtedly said enough to prove the danger of very violent shocks, even when they fall upon parts of a more compact texture than the brain, and to explain the wisdom and foresight which nature has displayed, in arranging the contrivances

vances destined to avoid or to diminish the effects of these concussions. It remains only, to finish this essay, that I should give a summary recapitulation of the effects of counter-strokes, considered either in their limited, or their most extensive sense; and to explain the principal curative intentions best adapted to the several kinds of mischiefs that may result from them.

From what has been hitherto said, we see how many different diseases may be referred to one single cause; and how various and numerous are the effects of counter-strokes. It is not therefore, without foundation, that, at the beginning of this essay, I declared, that the most serious disorders of surgery, and I might have added, of medicine, arose from a similar cause. All dislocations, wrenches, every diastasis, all contusions in the joints of the extremities, disjunctions of the sacrum, divulsion of the ligaments that connect it, and several of the injuries that happen to the pieces that constitute the spine, are they not the effects of counter-strokes? Are not most fractures accomplished by the same mechanism, as well as most abortions, descents of the uterus, and herniæ? Doth not this cause frequently make schirrous tumours degenerate into cancers, or produce the same effect on other swellings of a similar tendency? Have not counter-strokes often given rise to evident mischiefs in the important organs of the abdomen and thorax, when they were in a distempered state, and sometimes when they were sound? The most serious disorders of the brain, which we have not noticed, on account of the limits prescribed by the Academy, are they not the result of counter-strokes? How many subordinate accidents afterwards succeed all these original disorders which we have enumerated? From all these circumstances, it cannot be doubted, but that counter-strokes are among the most general causes of the disorders to which our frail machine is subject.

But notwithstanding the multiplicity and variety of the original accidents which are derived from this single cause, we observe, with satisfaction, that the intentions of cure to be followed in order to counteract these effects, whatever they may be, are always nearly the same, when

the injury hath happened in the viscera contained in the several cavities, the brain itself not excepted. Accordingly, we find, that in all these cases, repeated bleedings, perfect rest, and strict diet, are the remedies to be preferred (²). External applications in cases where they can be employed, are only accessory remedies, which however are not to be neglected; they must only be varied according to circumstances. Sometimes they are only to be such as to defend the parts, at other times, resolute spirituous topics are to be applied; sometimes emollient, relaxing and anodine remedies; sometimes saponaceous, balsamic, astringent aromatics, tonics, and artificial pumping upon the part, with natural or artificial medicinal waters, &c. These are all subordinate methods, to which we are sometimes the more obliged to have recourse, the more we have neglected, in the first instance, the principal modes of cure which we have treated of.

A subject so difficult, and so extensive, required more genius to be well understood, more talents and knowledge to be treated to the satisfaction of the Academy. I have at least exerted my best endeavours to fulfill the conditions of the thesis; and can only judge of my efforts, without being answerable for the success of them; nor shall I think my labours useless, if they can only intitle me to some attention from those who are to decide upon them.

NOTES

AUTHOR'S NOTES

ON

COUNTER-STROKES.

(a) I DO not mean to say, that writers have been entirely ignorant of this kind of cause, although they have not mentioned it under the specific term of counter-stroke ; much less do I assert, that their practice has never been directed according to the mechanism, by which the complaints they observed, had been produced. This would be to allow neither reflection nor genius to our predecessors. I imagine only, that in many cases, their attention has been rather engaged in discovering the nature of the accident, than in reflecting upon the several ways in which it might have been produced.

(b) We must here make an allowance, for the loss of the power of motion, by communication.

(c) This is the case of the cable that is veered away, for a certain time, in order to stop the boat gradually. If the head bore upon an inflexible column, its motion, in falling upon the feet, would be stopped, at the very instant that the feet came to the ground ; while the soft viscus, contained

contained in the cavity of the cranium, would continue to strike against the basis of this cavity, with all the force that would have been imparted to it, by the velocity it would have acquired in the fall. This would produce, in the organization of this important viscus, a disturbance of the same kind as that which was observed in the brain of a criminal, who, running from a few paces back, dashed his head against the wall of his prison. But the cartilages which line all the joints, those which unite the vertebræ with each other, and especially the various inflexions of the body in falls upon the feet, are the cause that the head, coming near the ground when these parts are already at rest, can only lose its motion in a gradual and imperceptible manner.

(d) I have seen patients, cured of a fracture of the fibula, remaining a long time unable to walk without crutches.

(e) This was the third death I had seen happen at the same period, and with the same symptoms, after compound fractures of the legs which had been well reduced; this circumstance led me to reflect. I inquired for the limb, and examined the state of the tibia; the marrow contained in the cylinder of this bone, was somewhat in a state of dissolution towards the fractured extremities, and the smell of it was putrid in the highest degree. This circumstance made me imagine, that a portion of the putrid miasmata produced by the dissolution of the marrow, having been absorbed, had occasioned a true nervous disease; and in consequence of this idea, I determined to adopt some other mode of proceeding in the first case of the kind which my practice might furnish me with. The opportunity soon presented itself; when, instead of putting the two ends of the tibia in exact apposition, I placed them in such a manner, that by means of their situation, and of a detached piece of bone which I took away, I could conveniently throw into the cavity of the bone any injection I might think proper; so that I treated this case as every compound fracture is treated, with the additional precaution only, of injecting upwards and downwards into the cavity of the bone, at every dressing. By this contrivance, my patient was exempt from any of those symptoms which had successively

ſucceſſively deſtroyed three others whom I had attended; and recovered with only a very trifling deformity of the leg. I wait for other opportunities of verifying theſe conjectures, in order to ſend to the Academy an eſſay upon a point of doctrine which ſeems to be new.

(f) Miſchiefs nearly of the kind, may very poſſibly be the reſult of a violent commotion which the marrow of the bone may have ſuffered in a fall, or a ſtroke upon the part; and in that caſe, they would ſtill be the effects of a counter-ſtroke upon a ſoft part.

(g) I have had ſeveral inſtances of ſimilar internal exfoliations; and not long ago, I extracted one of three inches from the inſide of the tibia, but the diſeaſe had not been the reſult of any violence.

(h) Probably the fall on the knees, in this inſtance, had cauſed a fracture of the thigh ſo near the joint, only on account of the woman having an old ſub-luxation of the leg, ſo that there was a deformity in the part, which gave an oblique direction to the ſhock.

(i) The cotyloide cavity preſenting an oval cup, the great diameter of which, is from above downwards, admits, by this contrivance, of this gliding, which contributes to deſtroy the motion by degrees.

(k) See Mr. PETIT's treatiſe on the diſeaſes of the bones.

(l) No man can have a greater veneration for the memory of the celebrated Mr. PETIT than I have; nor can entertain a more profound reſpect for the opinions of this great man: but I have never had reaſon to be ſatiſfied with the large inciſions recommended by him, in certain caſes, to empty collections of matter in the joints; perhaps my practice may not yet have been ſufficiently extenſive, or perhaps I may not have employed theſe inciſions in the proper caſes.

(m) If

(*m*) If we recollect the manner in which the spine bears upon the sacrum, and that this bone is inclined backwards, we shall see, that as the center of gravity of the upper parts, passes only through the basis of the os sacrum, the weight of these parts must necessarily tend to push this basis downwards and forwards, and consequently to raise the point of the os coccygis backwards.

(*n*) Perhaps too these accidents were only the consequence of the contusion of the cartilages.

(*o*) It must be acknowledged, however, that the unfavourable state of the woman, and the diffusion of the milky secretion were auxiliary causes, without which, the external cause might possibly have produced no mischief.

(*p*) Histoire de l' Académie, tom. iv. page 19.

(*q*) The divulsion and extension of the ligaments connecting these bones, sometimes concurs powerfully in producing these mischiefs; but it must be acknowledged, that they may be the result, of the mere contusion or sinking in of the bony substance of the last vertebræ of the loins, or of the os sacrum, without extension or divulsion of the ligaments which strengthen their connection with each other.

(*r*) It is taken for granted, that in cases of apparent displacing of the bones; all the means, proper to bring about the reduction or natural conformation of the parts, have been tried.

(*s*) A fracture is often the only effectual mode of preservation, that nature could have adopted under certain circumstances.

(*t*) Nothing can be added to what the celebrated Mr. PERIT says, in his work upon the diseases of the bones, concerning the treatment proper for these complaints.

(*u*) I never

(u) I never saw any erysipelas after the application of this mixture.

(w) See his essay upon this subject, in the fourth volume, 4to, of the Memoirs of the Royal Academy of Surgery at Paris, page 614.

(x) It might, however, be possible, that a carious spot in the bone, assisted with a depravation of the fluids, might have given rise to the fever and other symptoms, which appeared to be the consequence of it.

(y) I desire it may be remembered, that in the first instance, I have classed among the effects of counter-strokes taken in the most confined sense, such injuries only as might be produced by the immediate application of a shock upon the part, where the disorder is seated; from whence it follows, that dislocations not being included in this class, it appears to me, that they should only be considered as the effects of counter-strokes, taken in the most extensive sense.

(z) It is taken for granted, that in cases of dislocation or fracture, the parts have been previously reduced.

THE END.

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